IBM Integration Bus

Workload Management
Throughput Control

June, 2013

Hands-on lab built at product
code level Version 9.0.0.0

1. Introduction to Workload Management

Workload Management is a new feature in IBM Integration Bus V9 which allows system administrators to monitor and adjust the speed that messages are processed, as well as controlling the actions taken on unresponsive flows and threads. Unresponsive flows will be covered in another lab.

The following topics explain the various options available under workload management:

Message flow notification

A common requirement is to be able to monitor the speed at which IBM Integration Bus processes messages. Workload management allows the system administrator to express a notification threshold for individual message flows deployed. An out of range notification message is produced if the notification threshold is exceeded. A back in range notification message is produced if the notification threshold later drops back into range.

Setting the maximum rate for a message flow

The system administrator can set the maximum rate that an individual message flow can run at. The maximum rate is specified as the total number of input messages processed every second. When set, the number of input messages that are processed across the flow is measured. This measure is irrespective of the number of additional instances being used, the number of input nodes in the message flow, or the number of errors that occur. If necessary, a processing delay is introduced to keep the input message processing rate under the maximum flow rate setting.

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Unresponsive message flows

Allows you to specify and monitor the maximum amount of time that any message flow is allowed to process a message for, and to specify an action to be taken if the timeout is exceeded. Additionally, manual requests can be made to stop a message flow by restarting the execution group.

This lab will cover throughput control of messages flows - message flow notification and setting the maximum rate for a message flow. The following lab will cover unresponsive message flows. You do not need to complete this lab before beginning the unresponsive message flows lab.

2. An example of Workload Management

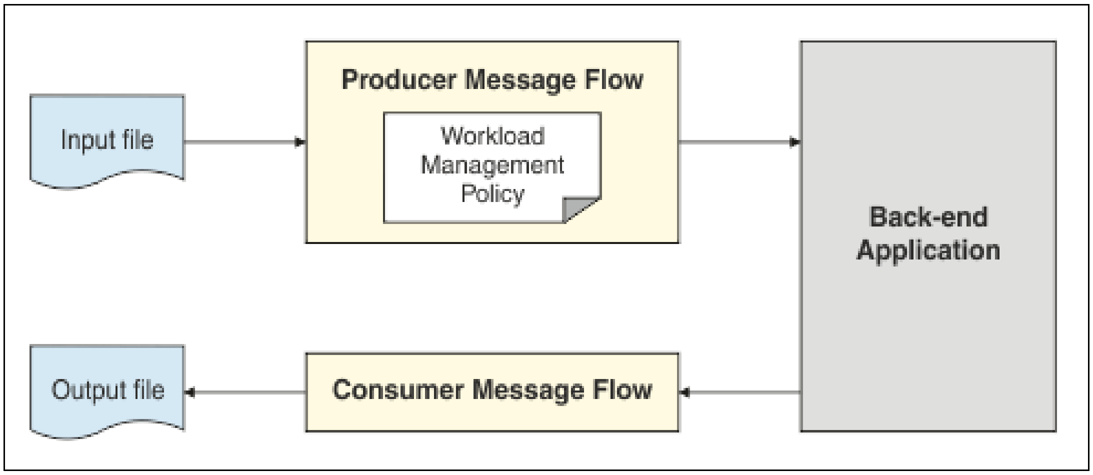
This example demonstrates how an IBM Integration Bus administrator can control the rate at which message flows process data without redesigning the message flow.

The default behaviour of a message flow is to process work as fast as possible, with no delay between messages or records. If a message flow calls a back-end system during its processing, and the message flow receives an unexpectedly high volume of work, the back-end system might be put under unexpectedly high load.

Using this sample, you can demonstrate how using Workload Management features on the outbound message flow can limit the rate at which the message flow is processed, and so avoid overloading the back-end application.

This sample uses a small Java application which simulates a real-time backend system invoked via TCP/IP. The broker provides a batch interface to that application via files - the file is CR-LF delimited and contains a lot of records. The broker reads files from an input directory and sends each record to the backend TCP/IP application. It receives TCP/IP responses and appends them to another file. Using a large file as input to the flow allows a workload to be simulated which will run for long enough to observe the processing rate.

The backend program is designed to simulate a system which will not handle being called at a high rate, and will also show the rate at which it is being called.



2.1 Setup the environment

1. The environment for this lab has already been configured for you on the VMware image. The Workload Management Sample application uses the FileInput Node for starting the message flow. This requires the environment variable

   MQSI_FILENODES_ROOT_DIRECTORY=C:\WLMSample

   The directory for the file nodes has already been created. The environment variable designates C:\WLMSample as the root which has subdirectories fileinput and fileoutput.

2.2 Import the Application

1. If not open, start the Integration Bus Toolkit by double-clicking its desktop icon
   For the Toolkit, use the workspace **c:\workspaces\IBWorkshop** or you may use your existing workspace.

   If not open, start the IB Explorer by double-clicking its desktop icon (MQ Explorer).

2. If you receive the welcome pane, click the arrow on the top right to exit the Welcome screen.

   In the toolkit's lower left, in the Integration Node's view, ensure that the IB9NODE is started. If it is stopped, start it by right-clicking IB9NODE, then selecting Start.

3. Right-click in the white space of the Application Development navigator, and select Import.

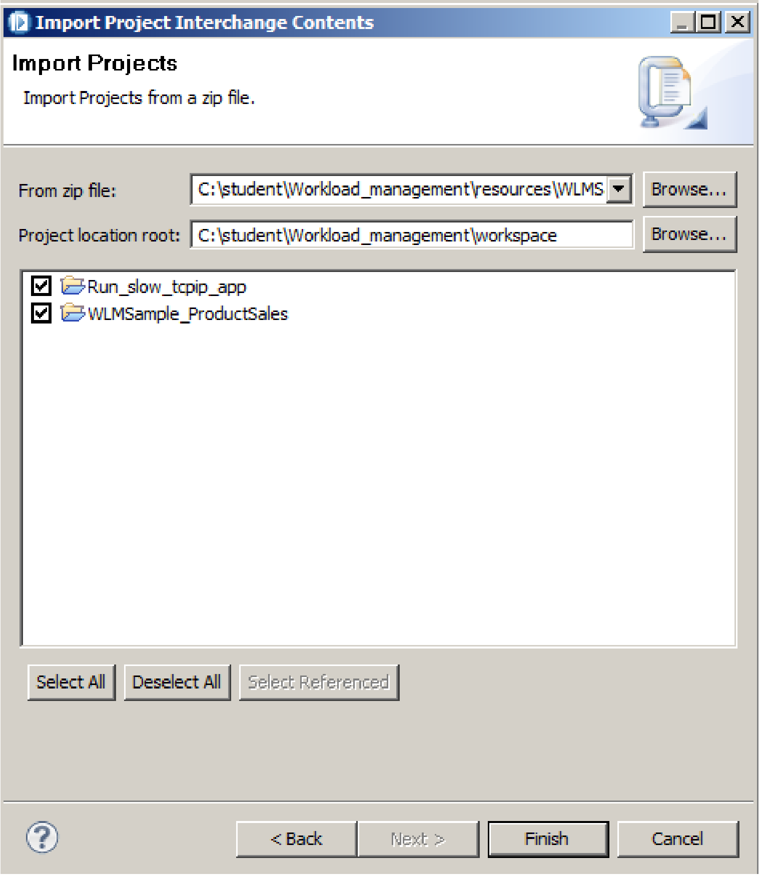
4. On the Import Select panel, expand Other by clicking the plus sign and select Project Interchange.

   Click Next.

5. Click Browse and navigate to C:\student\Workload_Management\resources\.

   Click WLMSample.pi.zip.

6. On the Import Projects panel, the two projects should already be checked. Click Finish.


Import Project Interchange Contents

Import Projects

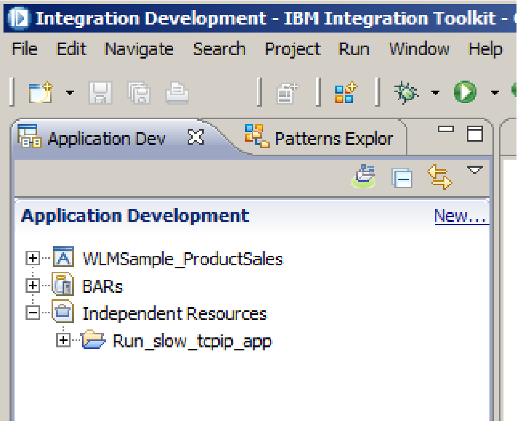
Import Projects from a zip file.

From zip file: C:\student\Workload_management\resources\WLMS

Project location root: C:\student\Workload_management\workspace

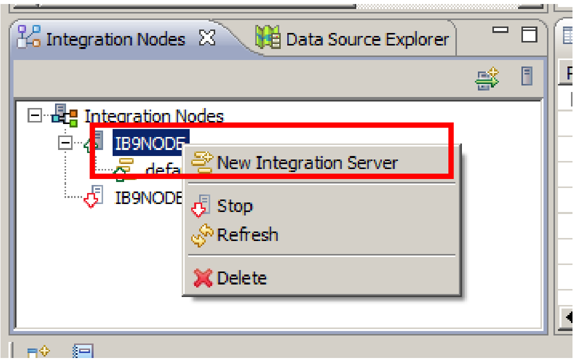
☑ Run_slow_tcpip_app
☑ WLMSample_ProductSales

The application, BAR file, and other resources are now imported and displayed in the Application Development navigator.



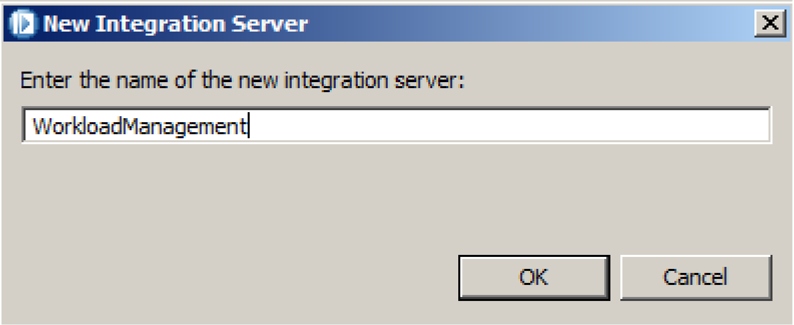
2.3 Deploy the application

1. Create a new integration server (execution group) by right clicking on IB9NODE and selecting New Integration Server.



2. Name the Integration Server WorkloadManagement, and click OK.

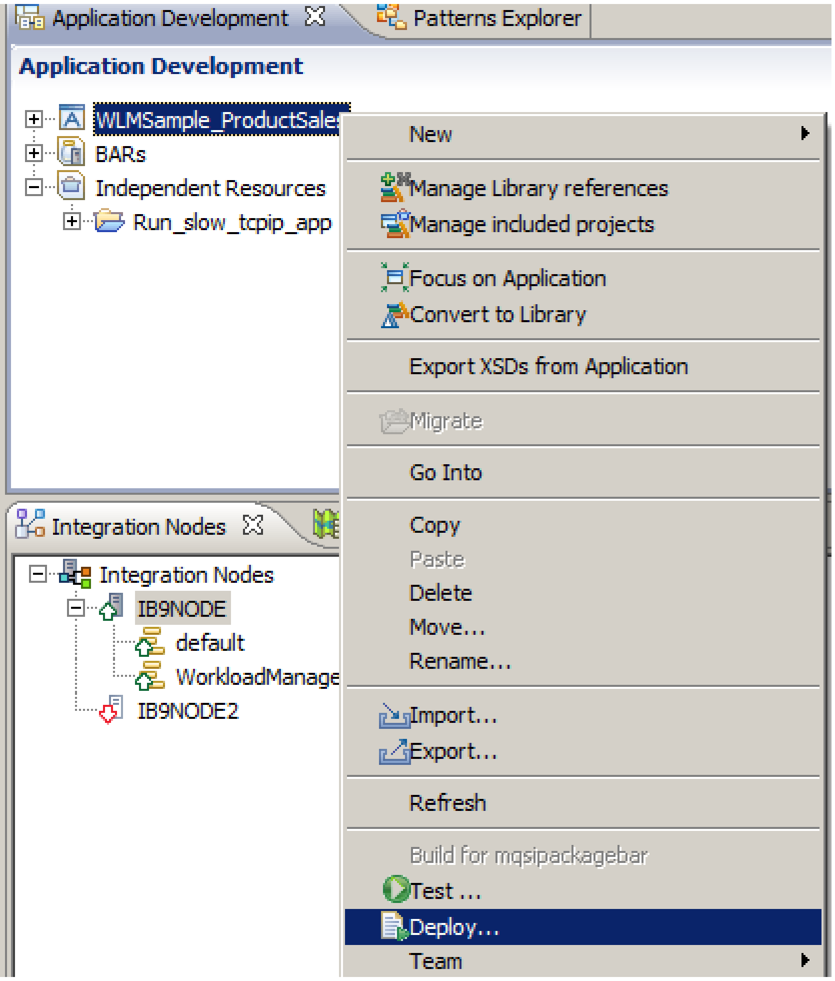
   Note – the name of the new server is case-sensitive, since some scripts provided later in the lab reference the server name.



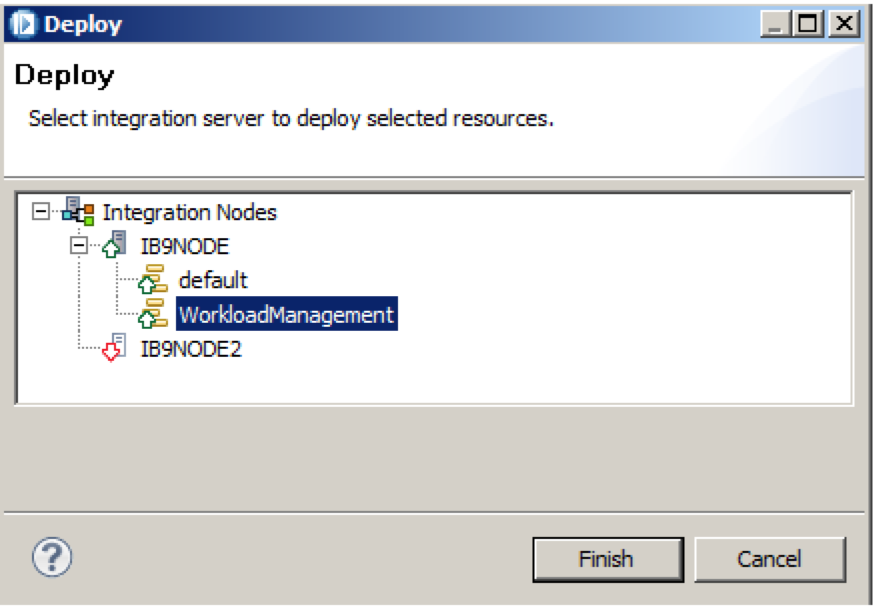
Enter the name of the new integration server:

WorkloadManagement

3. Deploy the application by right-clicking on WLSample_ProductSales and selecting Deploy.



Select the WorkLoadManagement server and click Finish.



Deploy

Select integration server to deploy selected resources.

2.4 Start the monitor application

The Workload Management sample programs allow a pair of message flows (within an Integration Bus Application) to be driven as fast as they will go for a short time, using a large file. The back-end program gives an indication of the message rate being achieved by the flows. The main point of the sample is to allow you to observe how setting policies changes the rate at which the message flows invoke a back-end program. The instructions here describe how to use the sample flows in 3 ways:

1. Without any policy in place - the backend application will indicate that the flow is going too fast.
2. With the maximum rate set on the BAR file - the back-end application should indicate the flow is going at the rate you set.
3. With the maximum rate set via a policy, without changing the BAR file - this should also show the flow going at the rate you set.

Before you run any work through the sample, you need to ensure the back-end program is running. When you imported the sample, a project called Run_slow_tcpip_app was created in your Integration Toolkit workspace. This contains a batch file/shell script which will launch the back-end program from a command prompt.

1. Open an Integration Console by double-clicking on the desktop icon.

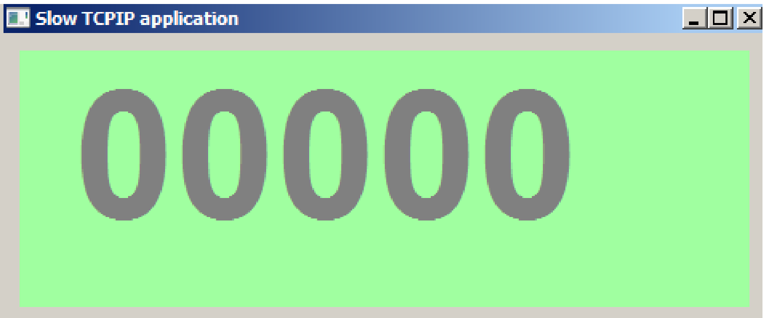
2. Navigate to your Integration Toolkit workspace directory where you imported the sample projects – ***C:\workspaces\IBWorkshop\*** (or your existing directory that you are using) and change into the Run_slow_tcpip_app subdirectory.

   Enter the following command to launch the back-end application.

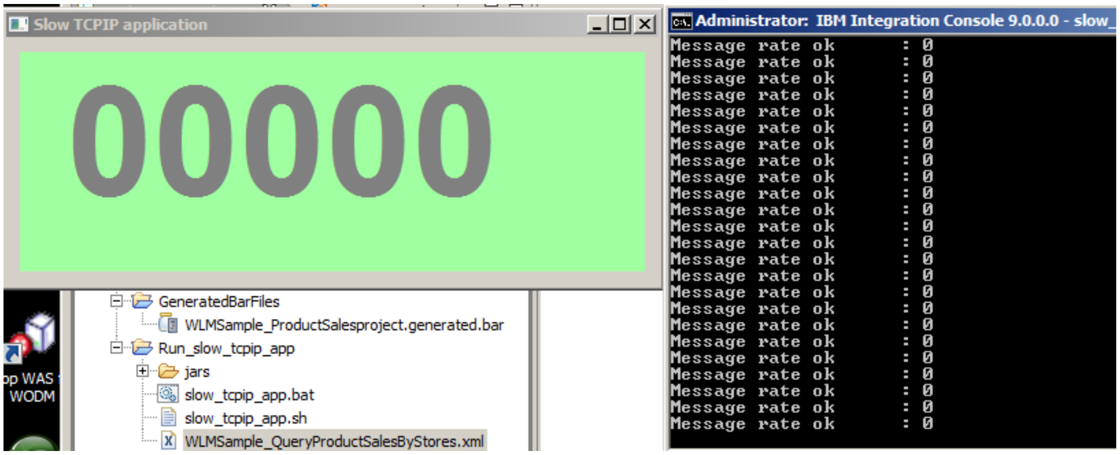
   ```
   slow_tcpip_app.bat 1445 10
   ```

   Make sure you add the parameters on the end, which are for the port (1445) and the maximum rate (10 messages per second).

3. You should see a window appear with a counter in it. The backend application should look like this:



4. Align the counter window and the console where you started the program so that you can see both.


Slow TCPIP application
00000
GeneratedBarFiles
WLMSample_ProductSalesproject.generated.bar
Run_slow_tcpip_app
jars
slow_tcpip_app.bat
slow_tcpip_app.sh
WLMSample_QueryProductSalesByStores.xml
p WAS
WODM
Administrator: IBM Integration Console 9.0.0.0 - slow_

```
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
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Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
Message rate ok       : 0
```
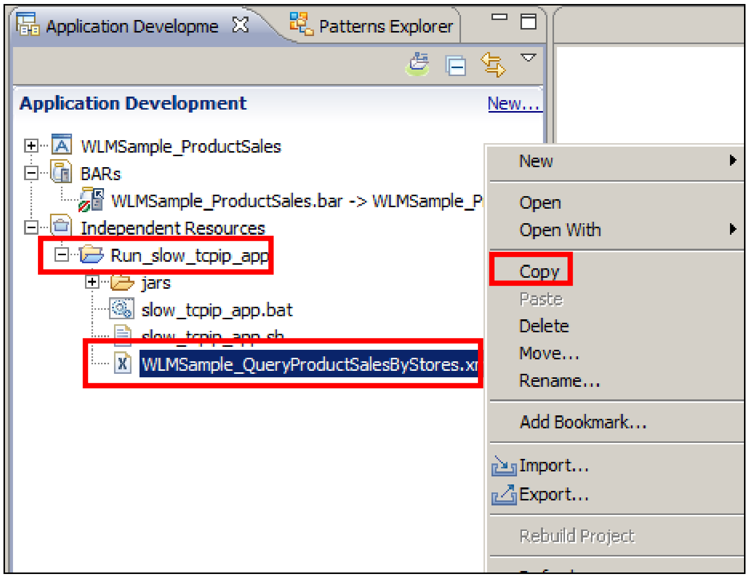

2.5 Run the application without any policy in force

The purpose of this step is to demonstrate that without a policy, the integration node will process data too fast for the back-end application. Remember that the back-end application will report warnings if it is driven at more than 10 messages per second.

1. A data file called `WLMSample_QueryProductSalesByStores.xml` is included in the same Run_slow_tcpip_app project that contains the back-end application. This contains 10000 records which should take around 1 minute to process on an average workstation.

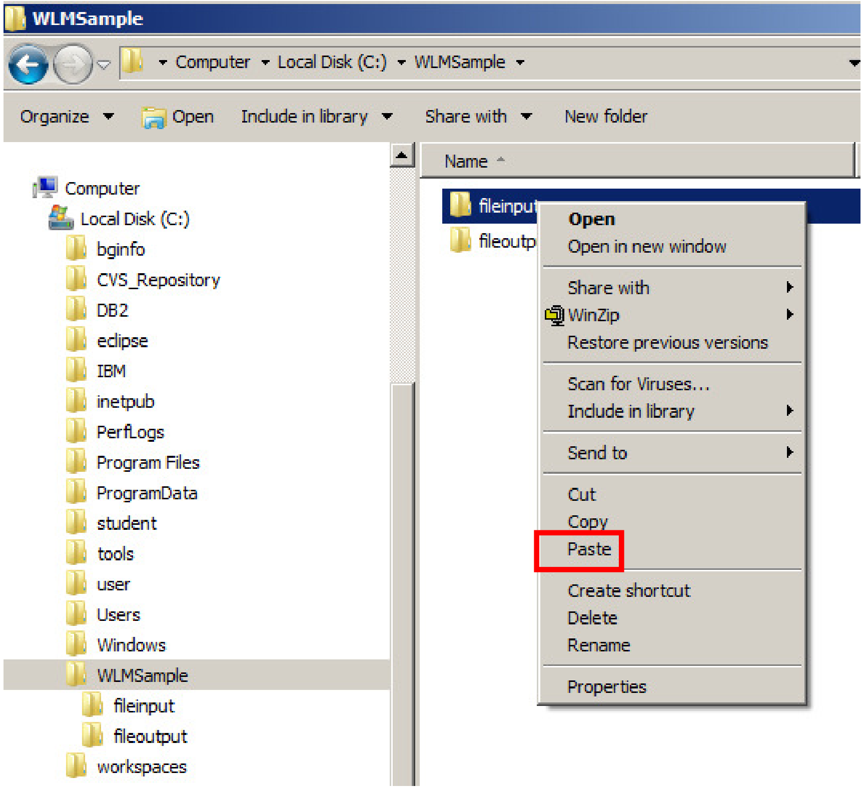
   In the Integration Toolkit Application Development navigator, expand the directory run_slow_tcpip_app.

   Right-click on the file `WLMSample_QueryProductSalesByStores.xml` and select Copy.



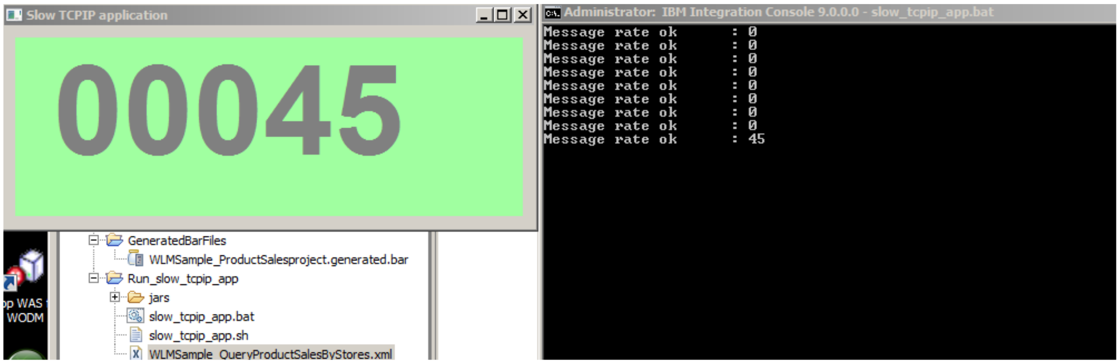
2. In Windows Explorer, navigate to ***C:\WLMSample*** directory.

   Right-click on the fileinput subdirectory and select Paste. This will drive the application, because this is the input directory for the FileInput node in the message flow. This is ***C:\WLMSample\fileinput*** which we configured at the beginning of the lab.



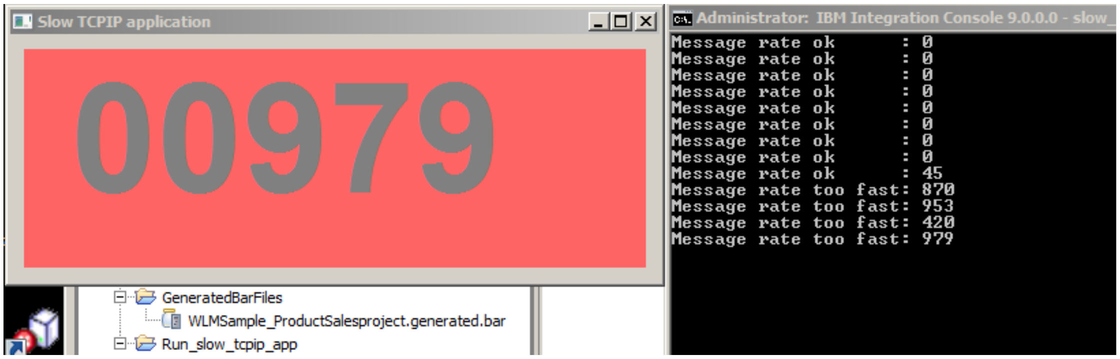
The directory C:\WLMSample is the root directory for the File Nodes in IIB. The file nodes are FileInput and FileOutput. These nodes are in the flows that are executing. The FileInput node has a property defined for the input path which is the fileinput subdirectory. The FileOutput node has a path property for his output directory which is the fileoutput subdirectory. The FileInput node creates three subdirectories; mqsitransition for files that are being processed, mqsiarchive for completed files, and mqsibackout for files that cannot be processed and are backed out by the flow.

3. After copying the file, you should see the counter on the backend application increase, but the message rate is still within limits, so the counter remains green. to a large number. This number indicates the message rate. The background of the window will turn red and the console window will show messages like "Going too fast" to show that the backend application is being overloaded.


Slow TCPIP application
00045
Administrator: IBM Integration Console 9.0.0.0 - slow_tcpip_app.bat
p WAS
WODM
GeneratedBarFiles
WLMSample_ProductSalesproject.generated.bar
Run_slow_tcpip_app
jars
slow_tcpip_app.bat
slow_tcpip_app.sh
WLMSample_QueryProductSalesByStores.xml

```
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 45
```

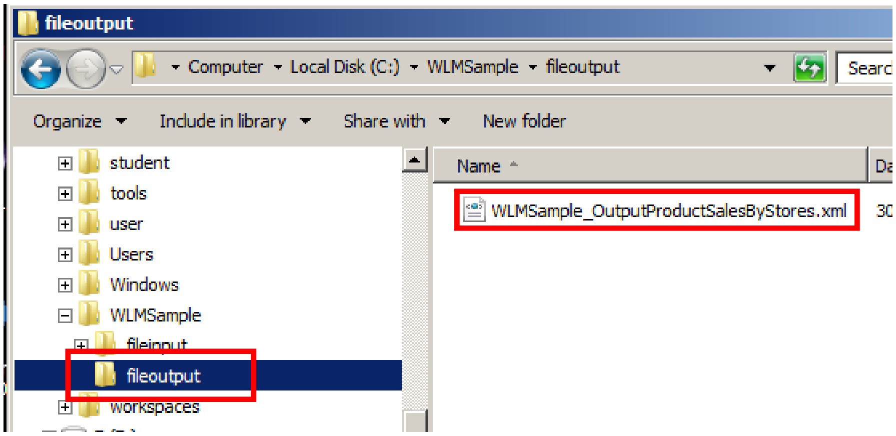
After a few seconds, you should see the counter on the backend application increase to a large number. This number indicates the message rate. The background of the window will turn red and the console window will show messages like "Going too fast" to show that the backend application is being overloaded.


Slow TCPIP application
00979
Administrator: IBM Integration Console 9.0.0.0 - slow_
GeneratedBarFiles
WLMSample_ProductSalesproject.generated.bar
Run_slow_tcpip_app

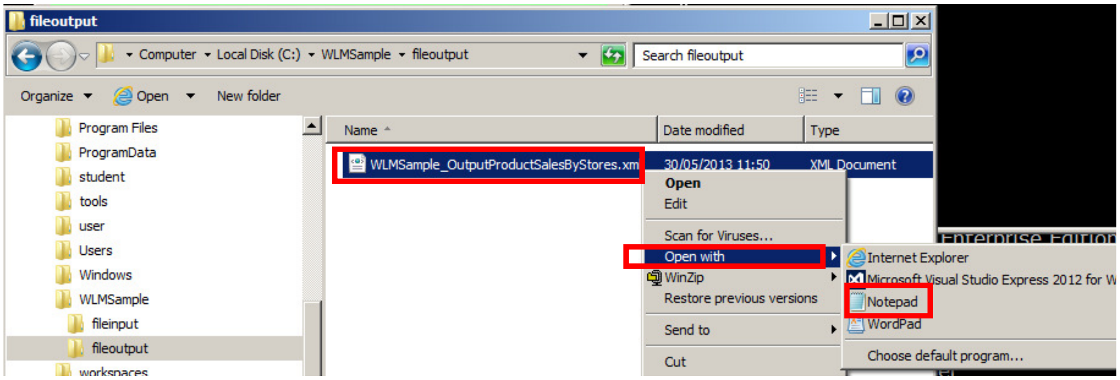
```
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 45
Message rate too fast: 870
Message rate too fast: 953
Message rate too fast: 420
Message rate too fast: 979
```

4. As the file is processed, you will see records added to the output file which is in `C:\WLMSample\fileoutput\WLMSample_OutputProductSalesByStores.xml` There should be 10000 lines added to that file once the data has been fully processed.

   Return to the Windows Explorer and open the C:\WLMSample\fileoutput directory. You will see the file there.

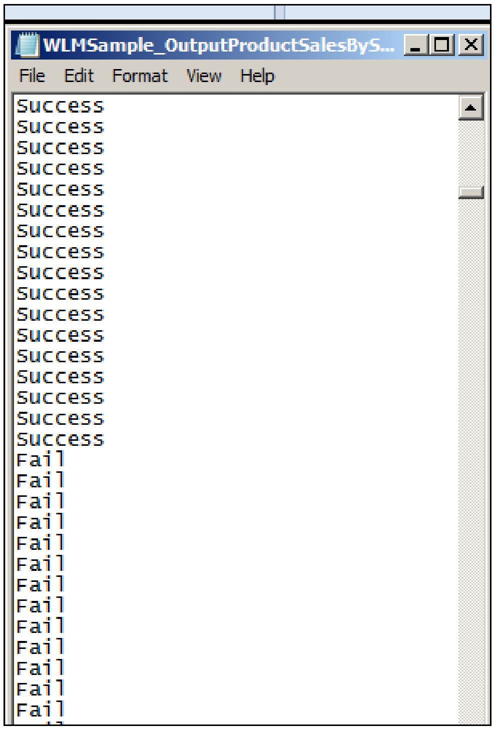


5. Right-click on the file and select Open With, Notepad.



6. The consumer application writes a “Success” or “Fail” record each record received. A “Success” record indicates that the message rate was within limits, but a “Fail” record was written when the message rate was too high and the back-end could not process due to overloading.

   Scroll down until you see the “Fail” records. You can see where the message rate was too high and a number of “Fail” records were written.



```
Success
Success
Success
Success
Success
Success
Success
Success
Success
Success
Success
Success
Success
Success
Success
Success
Success
Fail
Fail
Fail
Fail
Fail
Fail
Fail
Fail
Fail
Fail
Fail
Fail
Fail
```

   Close the Notepad window.

   You may leave the consumer window open. It will continue to produce messages saying the message is ok since the producer program is not running and the message rate is zero.

7. When the messages are completed (message rate returns to zero), delete the WLMSample_OutputProductSalesByStores.xml file in the C:\WLMSample\fileoutput directory.

2.6 Run the application with a hard coded rate limit

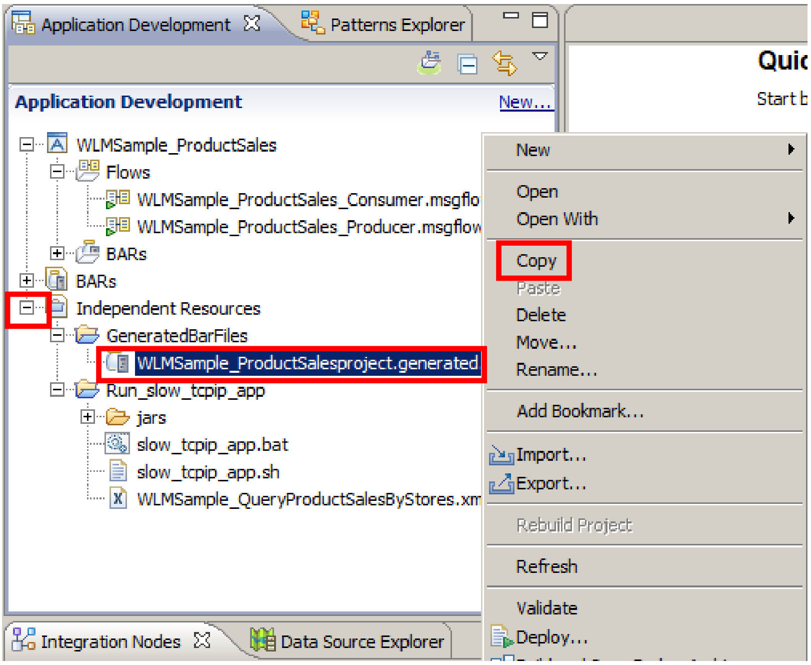
This exercise shows how you can update your barfile before deployment to control workload. These instructions will show how a limit of 10 messages per second is imposed on the message flow which routes data from the file to the backend TCP/IP application.

When the application was imported and deployed, the barfile named `WLMSample_ProductSales.bar` was generated and deployed. This barfile did not include any overrides to the default settings, so there was no workload limit imposed.

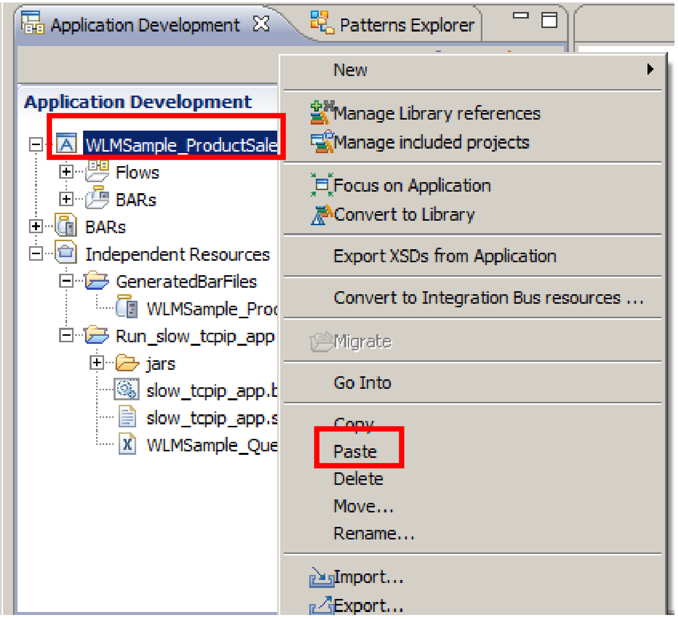
You can override a property on the `WLMSample_Producer` message flow in the BAR editor to impose a Maximum Rate of 10 messages per second.

1. Expand GeneratedBarFiles under Independent Resources.

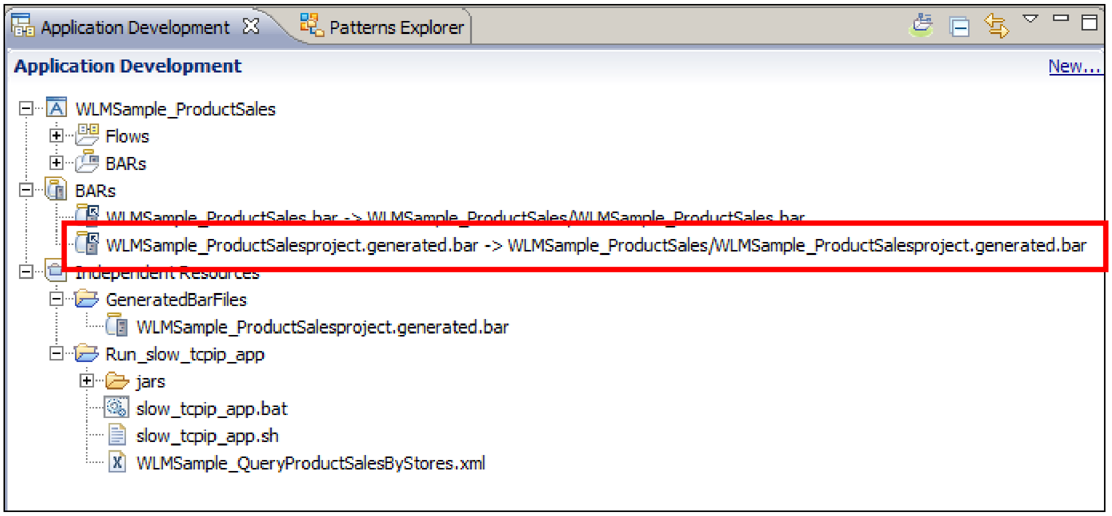
   Right-click on the WLMSample_ProductSalesproject.generated.bar file, and click Copy.



2. Right-click on the WLMSample_ProductSales and select Paste.



You will see new barfile with a generated name under the BARs folder.

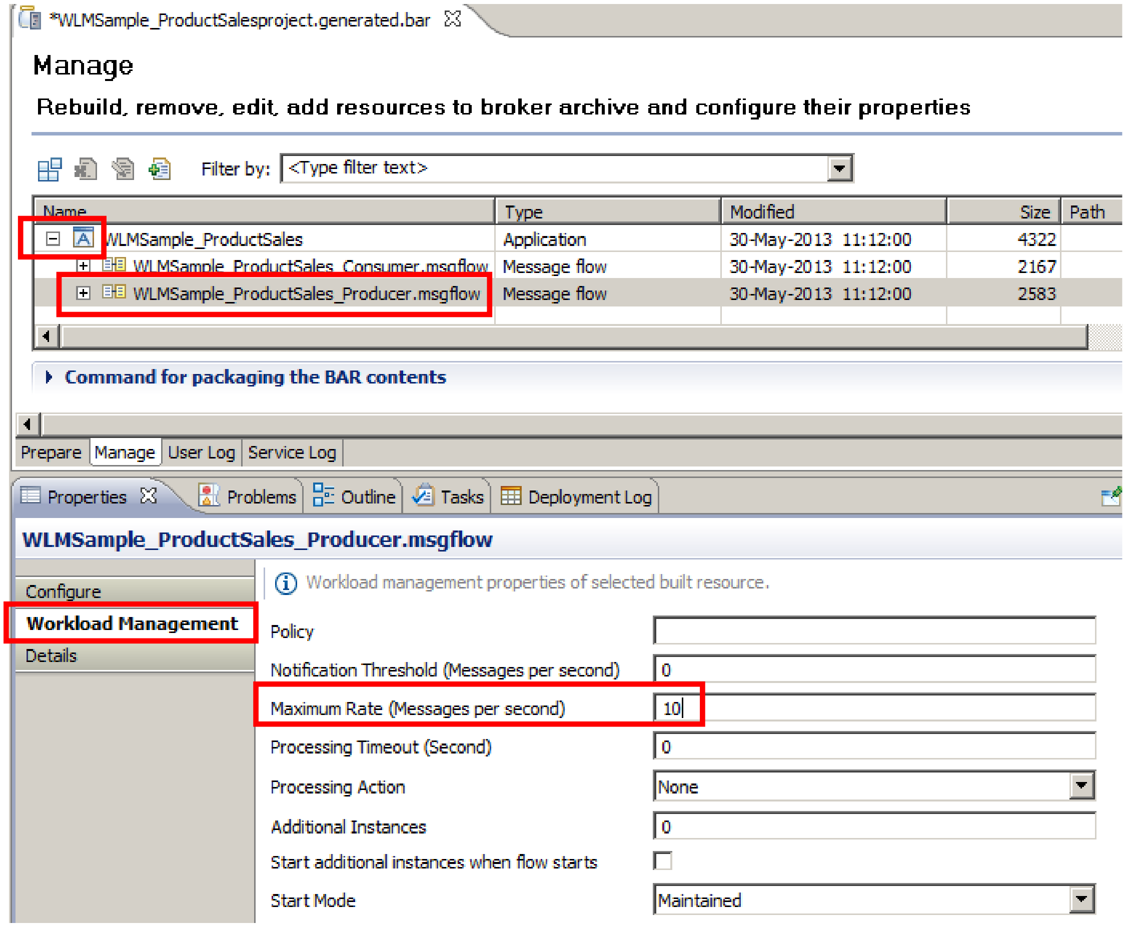

Application Development
Patterns Explorer
Application Development
New...
WLMSample_ProductSales
Flows
BARs
BARs
WLMSample_ProductSales.bar -> WLMSample_ProductSales/WLMSample_ProductSales.bar
WLMSample_ProductSalesproject.generated.bar -> WLMSample_ProductSales/WLMSample_ProductSalesproject.generated.bar
Independent Resources
GeneratedBarFiles
WLMSample_ProductSalesproject.generated.bar
Run_slow_tcpip_app
jars
slow_tcpip_app.bat
slow_tcpip_app.sh
WLMSample_QueryProductSalesByStores.xml

3. Open the newly copied barfile by double clicking on it.

   Navigate to the `Manage` tab in the BAR editor, and expand the application to show its message flows.

   Click on the Producer message flow and focus on the Properties pane. In the Properties pane, click on the `Workload Management` tab to show its properties.

   Set the Maximum Rate to 10 and save the barfile.



*WLMSample_ProductSalesproject.generated.bar

Manage

Rebuild, remove, edit, add resources to broker archive and configure their properties

Filter by: <Type filter text>

Name	Type	Modified	Size	Path
WLMSample_ProductSales	Application	30-May-2013 11:12:00	4322	
WLMSample_ProductSales_Consumer.msgflow	Message flow	30-May-2013 11:12:00	2167	
WLMSample_ProductSales_Producer.msgflow	Message flow	30-May-2013 11:12:00	2583	

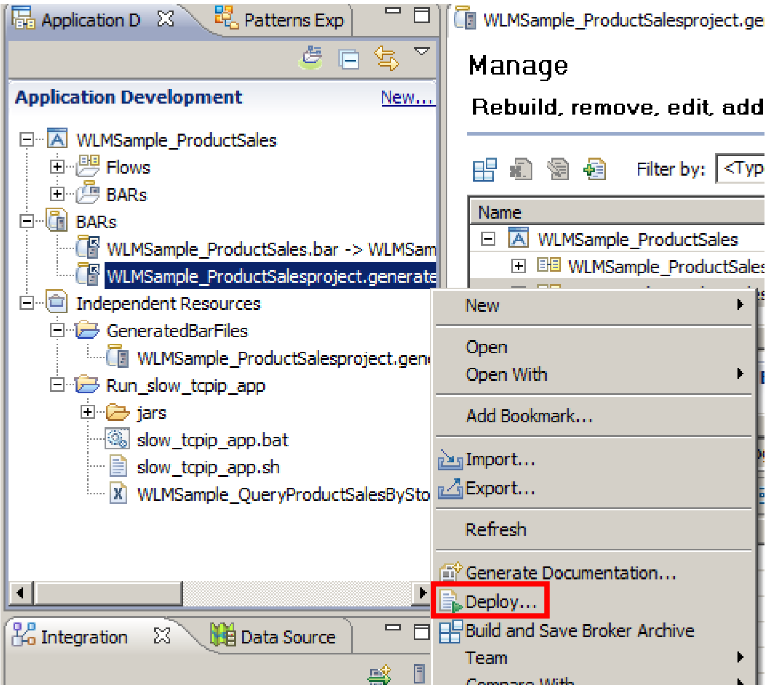
Command for packaging the BAR contents

WLMSample_ProductSales_Producer.msgflow

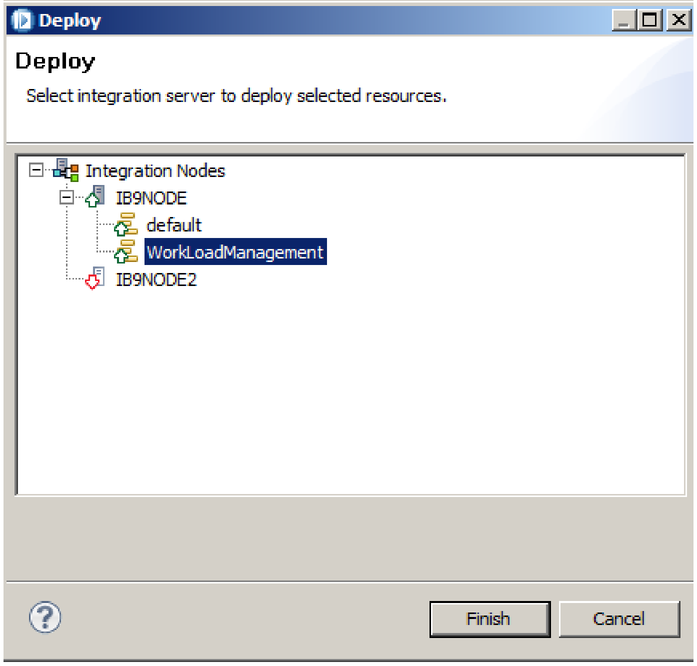
Workload management properties of selected built resource.

Policy	
Notification Threshold (Messages per second)	0
Maximum Rate (Messages per second)	10
Processing Timeout (Second)	0
Processing Action	None
Additional Instances	0
Start additional instances when flow starts	□
Start Mode	Maintained

4. To deploy the new barfile to the WorkloadManagement server, right-click it and select Deploy.



Click on the WorkloadManagement integration server and click Finish. This will replace the existing application.

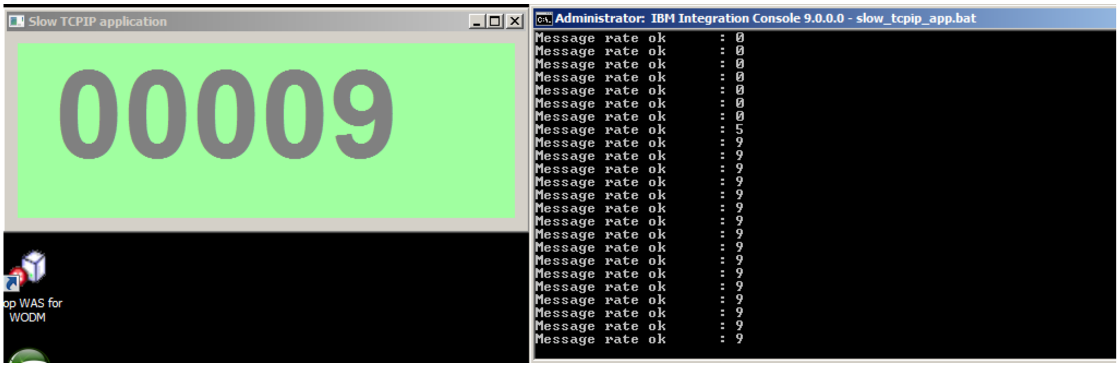


5. Once you have deployed the updated barfile, run the same sample data file through the system as in the previous section.

   Hints:

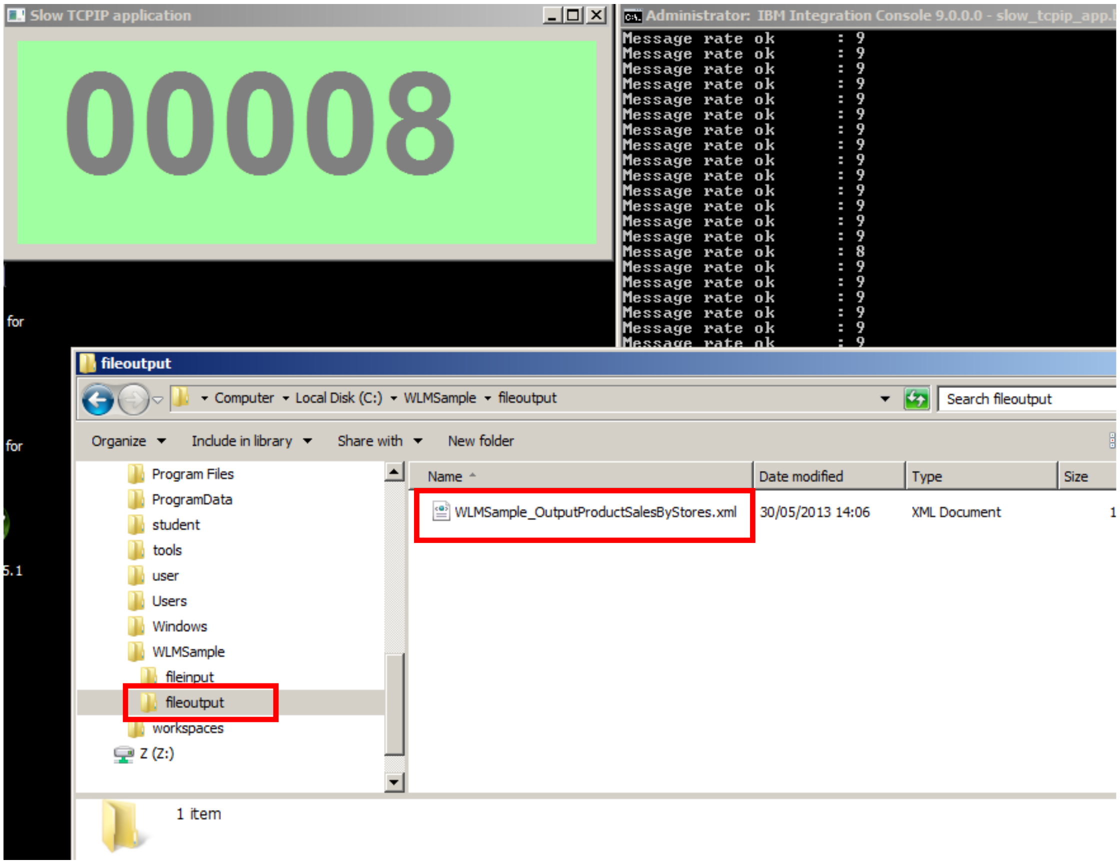
   - Ensure the back-end application is still running. Restart it as before if not running.
   - Take the sample data file and copy into your `fileinput` directory.

6. Observe that the backend application counter starts to change, but stays at the specified maximum rate (10 messages per second) rather than exceeding it as before.


Slow TCPIP application
00009
op WAS for
WODM
Administrator: IBM Integration Console 9.0.0.0 - slow_tcpip_app.bat

```
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 0
Message rate ok      : 5
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
```

7. Observe that the output file in the `fileoutput` folder starts to be written to. Check how long it takes to write the 10,000 output records to the file (it should take 1000 seconds or about 13 minutes).



```
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 8
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
Message rate ok      : 9
```

Name	Date modified	Type	Size
WLMSample_OutputProductSalesByStores.xml	30/05/2013 14:06	XML Document	1

8. You can experiment with setting different rate limits on the barfile.

9. When the messages are completed (message rate returns to zero), delete the WLMSample_OutputProductSalesByStores.xml file in the C:\WLMSample\fileoutput directory.

2.7 Run the application with an administrator-defined workload policy

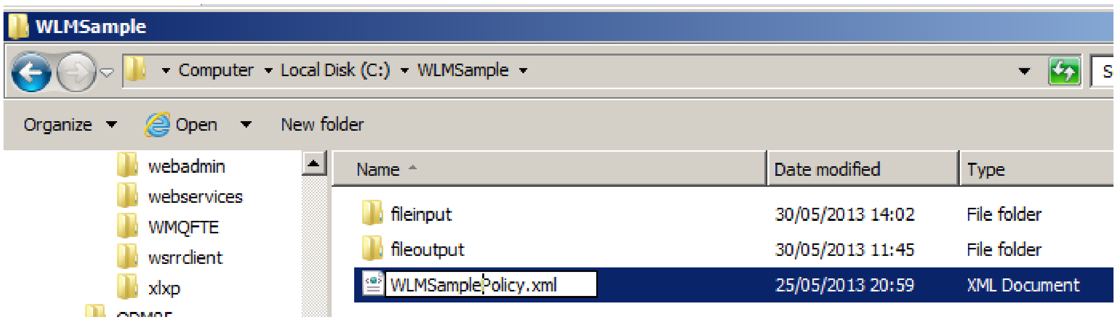
An administrator can create policies within the Integration Registry to change flow behaviour, including controlling the maximum rate of processing. These policies are then attached to one or more message flows. These can be created via the web user interface, or via commands. On the command line, a policy is defined via an XML file and loaded into the Integration Registry with a command, then attached to the flow you want to control.

You can experiment with viewing and using policies in the Web interface as well as commands when you do the Web Admin lab. You can also attach different policies which specify a different rate, or change the policy which is already attached, and you should observe that the rate changes dynamically without the need to restart your broker. Note that values set in a policy override values which you specified in the BAR file.

1. In Windows Explorer, navigate to C:\student\Workload_Management\resources.

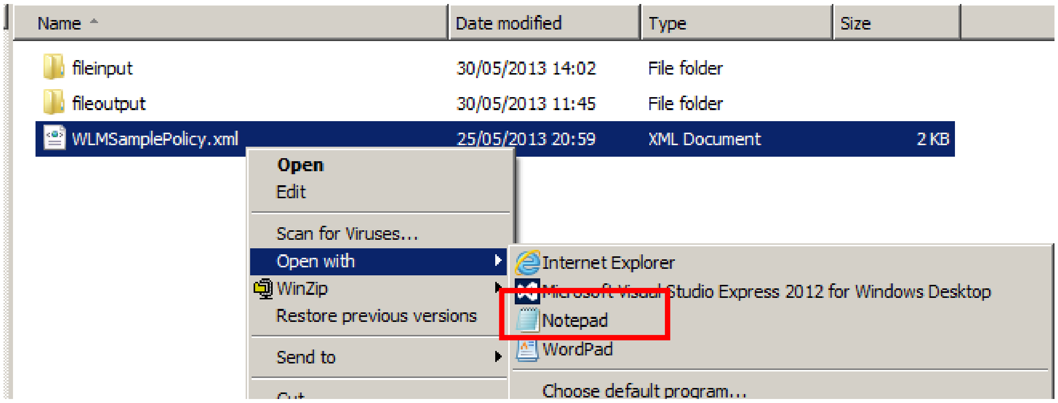
   The file WorkloadManagement_Policy.xml is the sample Workload policy from the Integration Bus (runtime) component installation directory.

   Copy this sample policy into the C:\WLMSample directory. Rename the file to WLMSamplePolicy.xml.


WLMSample
Computer ▸ Local Disk (C:) ▸ WLMSample ▸
Organize ▾ Open ▾ New folder
webadmin
webservices
WMQFTE
wsrrclient
xlxp

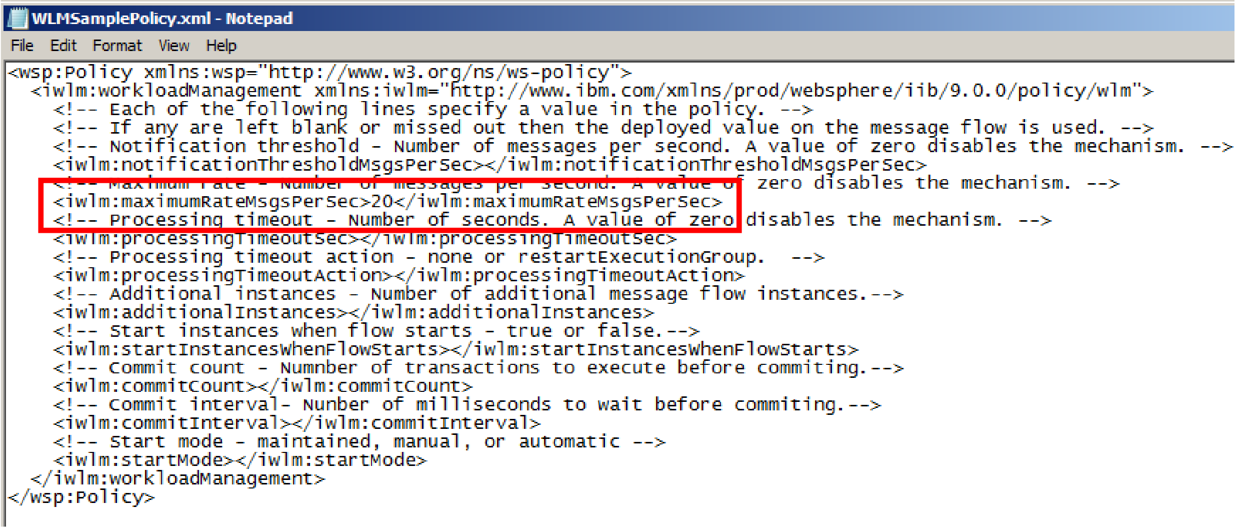
Name	Date modified	Type
fileinput	30/05/2013 14:02	File folder
fileoutput	30/05/2013 11:45	File folder
WLMSamplePolicy.xml	25/05/2013 20:59	XML Document

2. Open the WLMSamplePolicy.xml file with Notepad.


Open
Edit
Scan for Viruses...
Open with
WinZip
Restore previous versions
Send to
Internet Explorer
Microsoft Visual Studio Express 2012 for Windows Desktop
Notepad
WordPad
Choose default program...

Name	Date modified	Type	Size
fileinput	30/05/2013 14:02	File folder	
fileoutput	30/05/2013 11:45	File folder	
WLMSamplePolicy.xml	25/05/2013 20:59	XML Document	2 KB

3. Locate the tag `iwlm:maximumRateMsgsPerSec`. Replace the default value (zero) with a new value, for example 20, and save your changes, and close Notepad.



```
<wsp:Policy xmlns:wsp="http://www.w3.org/ns/ws-policy">
  <iwlm:workloadManagement xmlns:iwlm="http://www.ibm.com/xmlns/prod/websphere/iib/9.0.0/policy/wlm">
    <!-- Each of the following lines specify a value in the policy. -->
    <!-- If any are left blank or missed out then the deployed value on the message flow is used. -->
    <!-- Notification threshold - Number of messages per second. A value of zero disables the mechanism. -->
    <iwlm:notificationThresholdMsgsPerSec></iwlm:notificationThresholdMsgsPerSec>
    <!-- Maximum rate - Number of messages per second. A value of zero disables the mechanism. -->
    <iwlm:maximumRateMsgsPerSec>20</iwlm:maximumRateMsgsPerSec>
    <!-- Processing timeout - Number of seconds. A value of zero disables the mechanism. -->
    <iwlm:processingTimeoutSec></iwlm:processingTimeoutSec>
    <!-- Processing timeout action - none or restartExecutionGroup.  -->
    <iwlm:processingTimeoutAction></iwlm:processingTimeoutAction>
    <!-- Additional instances - Number of additional message flow instances.-->
    <iwlm:additionalInstances></iwlm:additionalInstances>
    <!-- Start instances when flow starts - true or false.-->
    <iwlm:startInstancesWhenFlowStarts></iwlm:startInstancesWhenFlowStarts>
    <!-- Commit count - Numnber of transactions to execute before commiting.-->
    <iwlm:commitCount></iwlm:commitCount>
    <!-- Commit interval- Nunber of milliseconds to wait before commiting.-->
    <iwlm:commitInterval></iwlm:commitInterval>
    <!-- Start mode - maintained, manual, or automatic -->
    <iwlm:startMode></iwlm:startMode>
  </iwlm:workloadManagement>
</wsp:Policy>
```

4. In an Integration Console, navigate to c:\WLMSample (where you have just copied the new policy file).

   Create a new policy from your new file by running the command:

```
mqsicreatepolicy IB9NODE
 -t WorkloadManagement
 -l SampleWLMPolicy
 -f WLMSamplePolicy.xml
```

   Note – You can copy and paste these commands from the C:\student\Workload_Management\data\workload_commands.txt file.

5. Attach the new policy to the `WLMSample__ProductSales_Producer` flow to control the outbound rate to the Java application by running the command:

```
mqsiattachpolicy IB9NODE
 -e WorkloadManagement
 -k WLMSample_ProductSales
 -m WLMSample_ProductSales_Producer
 -t WorkloadManagement
 -l SampleWLMPolicy
```

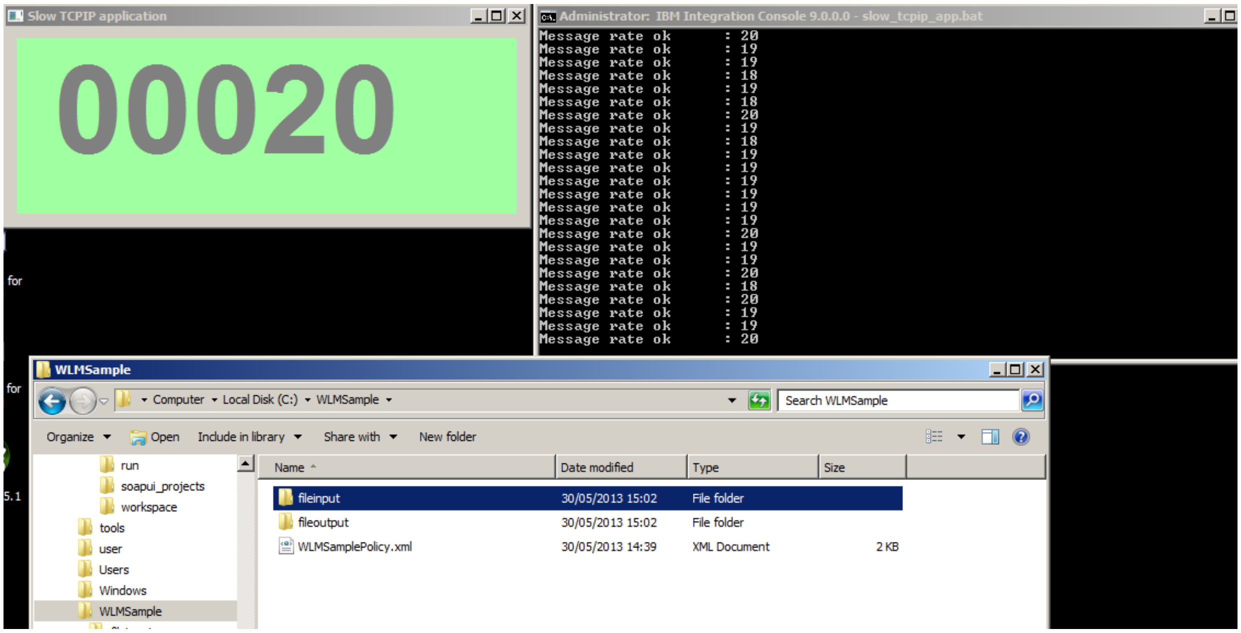
6. Stop the application 'slow_tcpip_app.bat' is if it still running. (Ctrl+C).

   Start the application with 20 rather than 10 messages/second as the maximum rate. Type in the command.

```
slow_tcpip_app.bat 1445 20
```

7. Follow the previous instructions in section 2.5 to load the sample data file into the `fileinput` directory.

8. Observe the rate at which records are sent to the Java application. This rate should match what you typed into the XML file in step 4.



```
Message rate ok         : 20
Message rate ok         : 19
Message rate ok         : 19
Message rate ok         : 18
Message rate ok         : 19
Message rate ok         : 18
Message rate ok         : 20
Message rate ok         : 19
Message rate ok         : 18
Message rate ok         : 19
Message rate ok         : 19
Message rate ok         : 19
Message rate ok         : 19
Message rate ok         : 19
Message rate ok         : 19
Message rate ok         : 20
Message rate ok         : 19
Message rate ok         : 19
Message rate ok         : 20
Message rate ok         : 18
Message rate ok         : 20
Message rate ok         : 19
Message rate ok         : 19
Message rate ok         : 20
```

Name	Date modified	Type	Size
fileinput	30/05/2013 15:02	File folder	
fileoutput	30/05/2013 15:02	File folder	
WLMSamplePolicy.xml	30/05/2013 14:39	XML Document	2 KB

As you can see, the workload management policy attached to the producer flow has throttled the message rate to 20 messages per second as coded in the xml policy file.

9. You can experiment with viewing and using policies in the Web interface as well as commands when you do the Web Admin lab. You can also attach different policies which specify a different rate, or change the policy which is already attached, and you should observe that the rate changes dynamically without the need to restart your integration node.

Important!
Note that values set in a policy will override values which you specified in the barfile.

10. When the messages are completed (message rate returns to zero), delete the WLMSample_OutputProductSalesByStores.xml file in the C:\WLMSample\fileoutput directory.

3. Controlling workload for backend applications

This section will show how to set a maximum rate for a message flow to control the workload being passed to a back-end application.

3.1 Import the Application

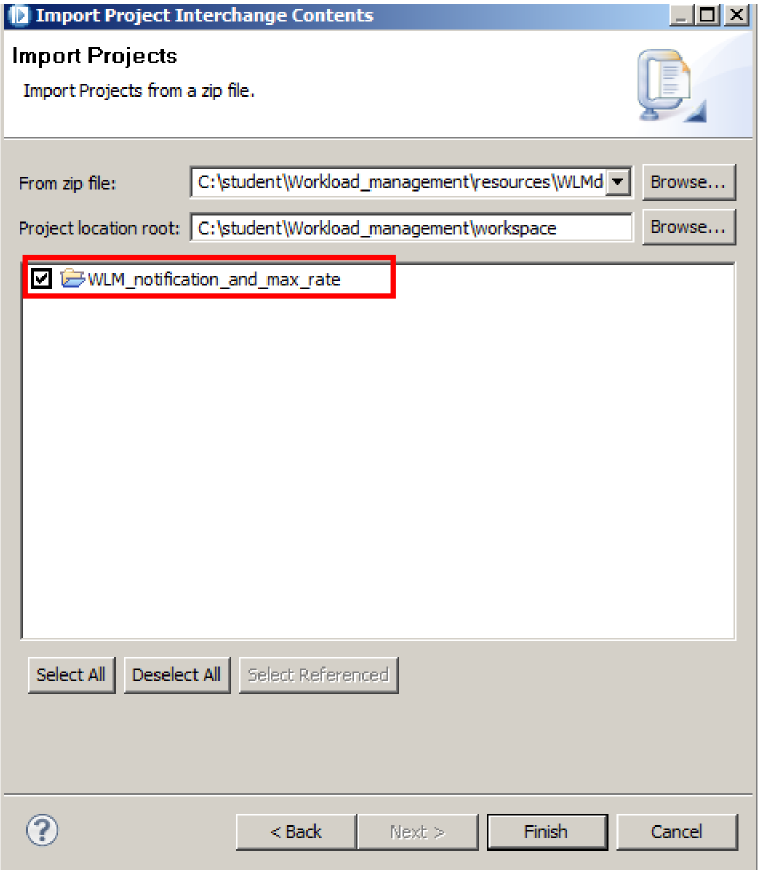
1. In the Integration Toolkit, right-click in the white space of the Application Development navigator, and select Import.

2. Navigate to C:\student\Workload_Management\resources\WLMdemo\WLM_not_and_max.

   Open the Project Interchange file WLM_not_max_pi.zip.

3. On the Import Project Interchange Contents panel, check the box for WLM_notification_and_max_rate (it should already be checked).

   Click Finish.



Import Project Interchange Contents

Import Projects

Import Projects from a zip file.

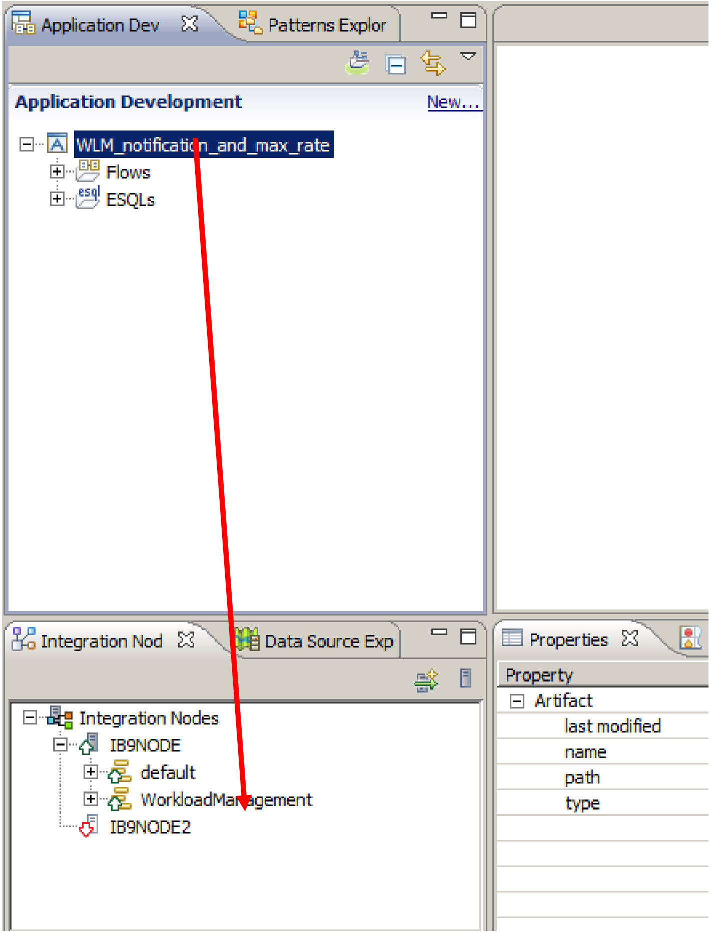
From zip file: C:\student\Workload_management\resources\WLMd

Project location root: C:\student\Workload_management\workspace

☑ WLM_notification_and_max_rate

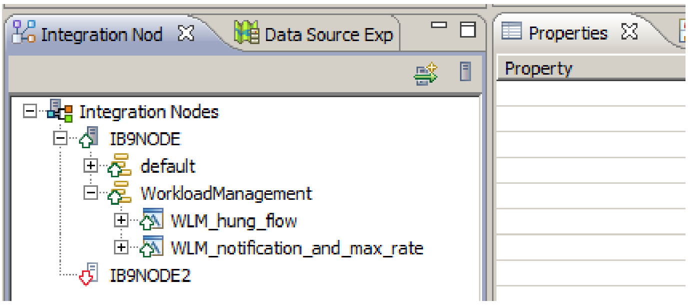
3.2 Deploy the application

1. Select the WLM_notification_and_max_rate application and deploy it to the WorkLoadManagement server.

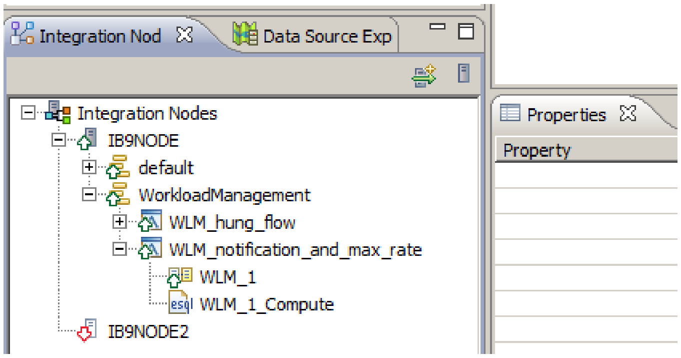


2. Expand the WorkloadManagement server.

   You will see that the application has been deployed and is running as indicated by the upward pointing green arrow.



   Expand the application also to see the artefacts which are deployed with the application. You will see the message flow WLM_1 and the ESQL for the WLM_1_Compute node within the flow. We are only concerned with the flow in this lab.



3.3 Run the application

1. Open three DOS command prompt windows by double-clicking the icon on the desktop.

   In each command prompt window, navigate to
   C:\student\Workload_Management\resources\WLMdemo\WLM_not_and_max

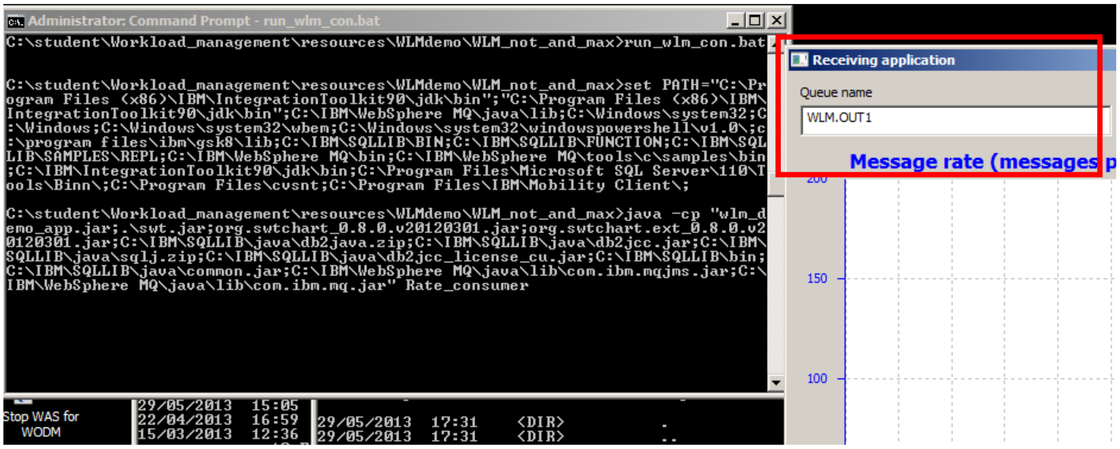
2. You will run one of three programs in each of the command windows:

   - producer of messages – produces messages as fast as possible
   - consumer of message – can only consume messages at 100 messages / second
   - listener for notification messages – will subscribe to topic string where notifications are published

   You can copy and paste the commands from the workload_commands.txt file in the C:\student\Workload_Management\data directory.

3. Select one window and run the consumer program by entering the following command:

   `run_wlm_con.bat`



Administrator: Command Prompt - run_wlm_con.bat

```
C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>run_wlm_con.bat


C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>set PATH="C:\Pr
ogram Files (x86)\IBM\IntegrationToolkit90\jdk\bin";"C:\Program Files (x86)\IBM\
IntegrationToolkit90\jdk\bin";C:\IBM\WebSphere MQ\java\lib;C:\Windows\system32;C
:\Windows;C:\Windows\system32\wbem;C:\Windows\system32\windowspowershell\v1.0\;c
:\program files\ibm\gsk8\lib;C:\IBM\SQLLIB\BIN;C:\IBM\SQLLIB\FUNCTION;C:\IBM\SQL
LIB\SAMPLES\REPL;C:\IBM\WebSphere MQ\bin;C:\IBM\WebSphere MQ\tools\c\samples\bin
;C:\IBM\IntegrationToolkit90\jdk\bin;C:\Program Files\Microsoft SQL Server\110\T
ools\Binn\;C:\Program Files\cvsnt;C:\Program Files\IBM\Mobility Client\;

C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>java -cp "wlm_d
emo_app.jar;.\swt.jar;org.swtchart_0.8.0.v20120301.jar;org.swtchart.ext_0.8.0.v2
0120301.jar;C:\IBM\SQLLIB\java\db2java.zip;C:\IBM\SQLLIB\java\db2jcc.jar;C:\IBM\
SQLLIB\java\sqlj.zip;C:\IBM\SQLLIB\java\db2jcc_license_cu.jar;C:\IBM\SQLLIB\bin;
C:\IBM\SQLLIB\java\common.jar;C:\IBM\WebSphere MQ\java\lib\com.ibm.mqjms.jar;C:\
IBM\WebSphere MQ\java\lib\com.ibm.mq.jar" Rate_consumer
```

Receiving application

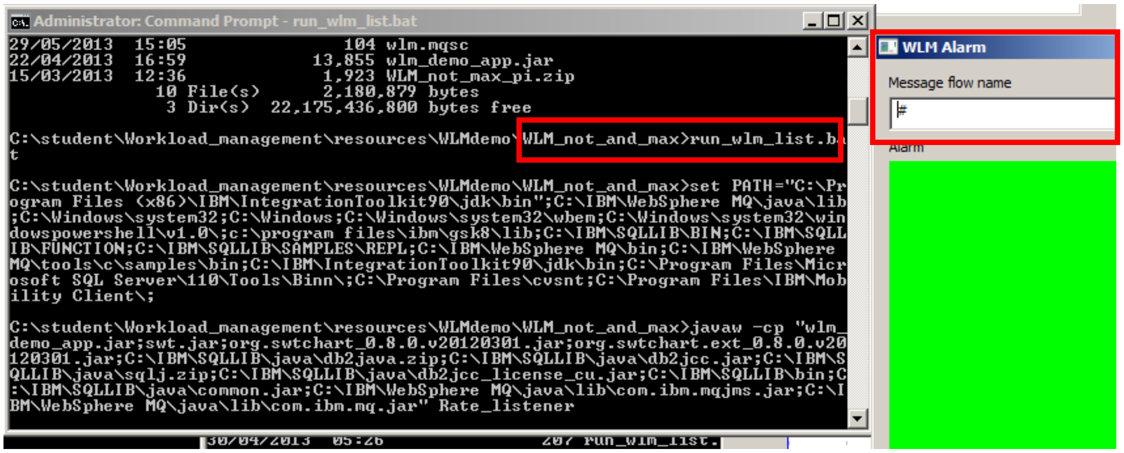
Queue name: WLM.OUT1

The application starts up and starts receiving messages on the queue WLM.OUT1 which is the output queue of MQOUTPUT node in the flow is sending the messages. A running bar graph is displayed showing the message rate at which it is receiving messages. It will send error messages to alert operators that the messages are coming faster than it can handle.

If the producer application is not running, you may see MQ return codes 2033. This is normal as there are no messages in the queue until the producer starts sending.

4. In another window, start the listener by typing in the following command:

```
run_wlm_list.bat
```



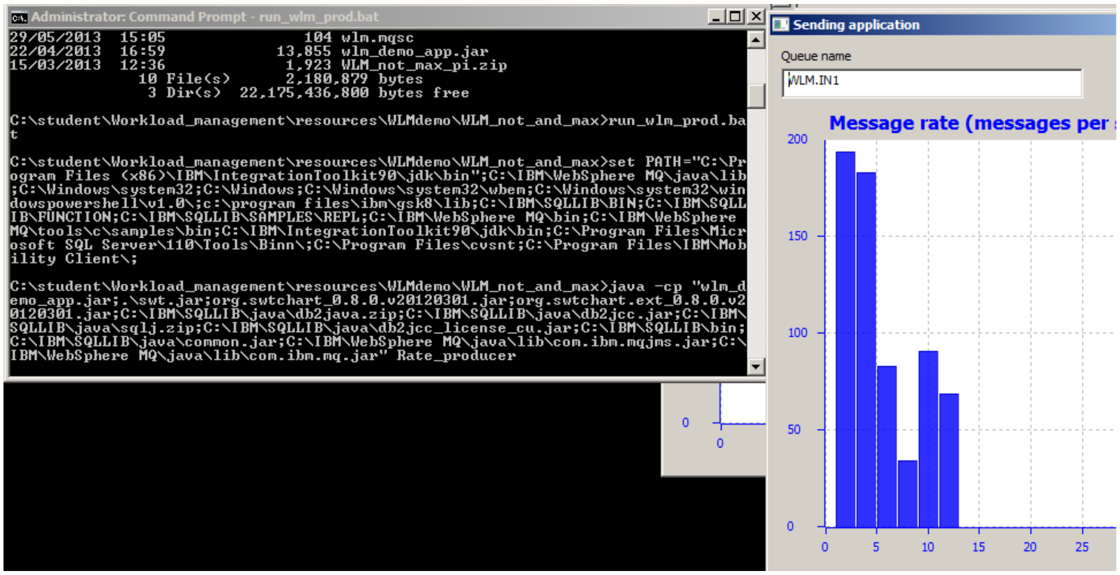
```
29/05/2013  15:05               104 wlm.mqsc
22/04/2013  16:59            13,855 wlm_demo_app.jar
15/03/2013  12:36             1,923 WLM_not_max_pi.zip
              10 File(s)      2,180,879 bytes
               3 Dir(s)  22,175,436,800 bytes free

C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>run_wlm_list.ba
t

C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>set PATH="C:\Pr
ogram Files (x86)\IBM\IntegrationToolkit90\jdk\bin";C:\IBM\WebSphere MQ\java\lib
;C:\Windows\system32;C:\Windows;C:\Windows\system32\wbem;C:\Windows\system32\win
dowspowershell\v1.0\;c:\program files\ibm\gsk8\lib;C:\IBM\SQLLIB\BIN;C:\IBM\SQLL
IB\FUNCTION;C:\IBM\SQLLIB\SAMPLES\REPL;C:\IBM\WebSphere MQ\bin;C:\IBM\WebSphere
MQ\tools\c\samples\bin;C:\IBM\IntegrationToolkit90\jdk\bin;C:\Program Files\Micr
osoft SQL Server\110\Tools\Binn\;C:\Program Files\cvsnt;C:\Program Files\IBM\Mob
ility Client\;

C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>javaw -cp "wlm_
demo_app.jar;swt.jar;org.swtchart_0.8.0.v20120301.jar;org.swtchart.ext_0.8.0.v20
120301.jar;C:\IBM\SQLLIB\java\db2java.zip;C:\IBM\SQLLIB\java\db2jcc.jar;C:\IBM\S
QLLIB\java\sqlj.zip;C:\IBM\SQLLIB\java\db2jcc_license_cu.jar;C:\IBM\SQLLIB\bin;C
:\IBM\SQLLIB\java\common.jar;C:\IBM\WebSphere MQ\java\lib\com.ibm.mqjms.jar;C:\I
BM\WebSphere MQ\java\lib\com.ibm.mq.jar" Rate_listener
```

Message flow name: #

The listener application starts another pop-up window which shows alarms received by the subscription. The application will change the color from green to red if the message rate is too high.

5. In the third window, start the producer program with the following command:

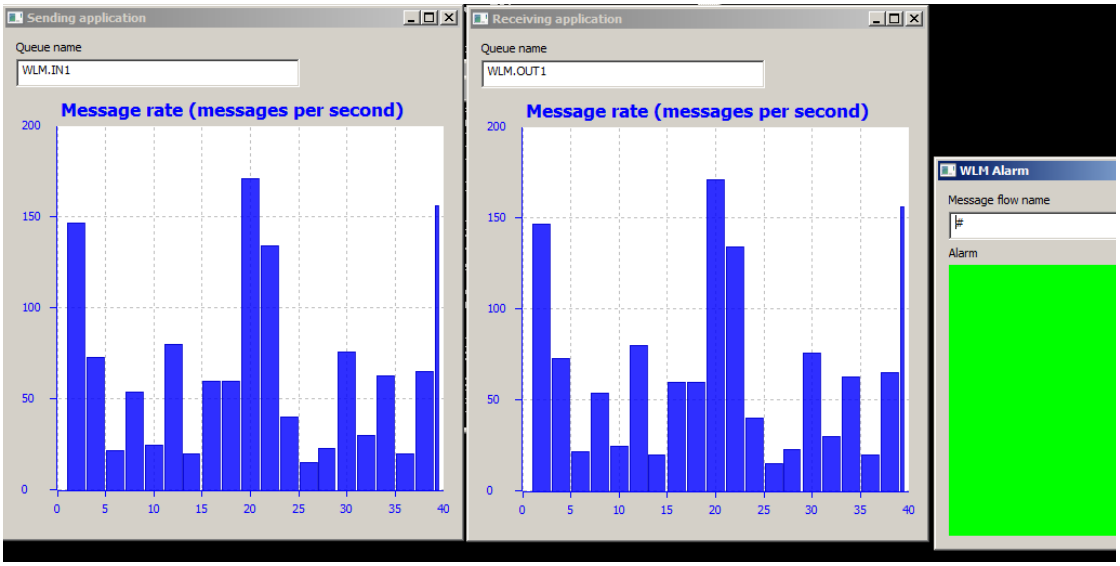
```
run_wlm_prod.bat
```


Administrator: Command Prompt - run_wlm_prod.bat
Sending application
Message rate (messages per
200
150
100
50
0
0
5
10
15
20
25
0
0

```
29/05/2013  15:05               104 wlm.mqsc
22/04/2013  16:59            13,855 wlm_demo_app.jar
15/03/2013  12:36             1,923 WLM_not_max_pi.zip
              10 File(s)      2,180,879 bytes
               3 Dir(s)  22,175,436,800 bytes free

C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>run_wlm_prod.ba
t

C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>set PATH="C:\Pr
ogram Files (x86)\IBM\IntegrationToolkit90\jdk\bin";C:\IBM\WebSphere MQ\java\lib
;C:\Windows\system32;C:\Windows;C:\Windows\system32\wbem;C:\Windows\system32\win
dowspowershell\v1.0\;c:\program files\ibm\gsk8\lib;C:\IBM\SQLLIB\BIN;C:\IBM\SQLL
IB\FUNCTION;C:\IBM\SQLLIB\SAMPLES\REPL;C:\IBM\WebSphere MQ\bin;C:\IBM\WebSphere
MQ\tools\c\samples\bin;C:\IBM\IntegrationToolkit90\jdk\bin;C:\Program Files\Micr
osoft SQL Server\110\Tools\Binn\;C:\Program Files\cvsnt;C:\Program Files\IBM\Mob
ility Client\;

C:\student\Workload_management\resources\WLMdemo\WLM_not_and_max>java -cp "wlm_d
emo_app.jar;.\swt.jar;org.swtchart_0.8.0.v20120301.jar;org.swtchart.ext_0.8.0.v2
0120301.jar;C:\IBM\SQLLIB\java\db2java.zip;C:\IBM\SQLLIB\java\db2jcc.jar;C:\IBM\
SQLLIB\java\sqlj.zip;C:\IBM\SQLLIB\java\db2jcc_license_cu.jar;C:\IBM\SQLLIB\bin;
C:\IBM\SQLLIB\java\common.jar;C:\IBM\WebSphere MQ\java\lib\com.ibm.mqjms.jar;C:\
IBM\WebSphere MQ\java\lib\com.ibm.mq.jar" Rate_producer
```

Queue name: WLM.IN1

6. Position the graphs and the alarm windows so you can see all three.



Sending application

Queue name: WLM.IN1

Receiving application

Queue name: WLM.OUT1

WLM Alarm

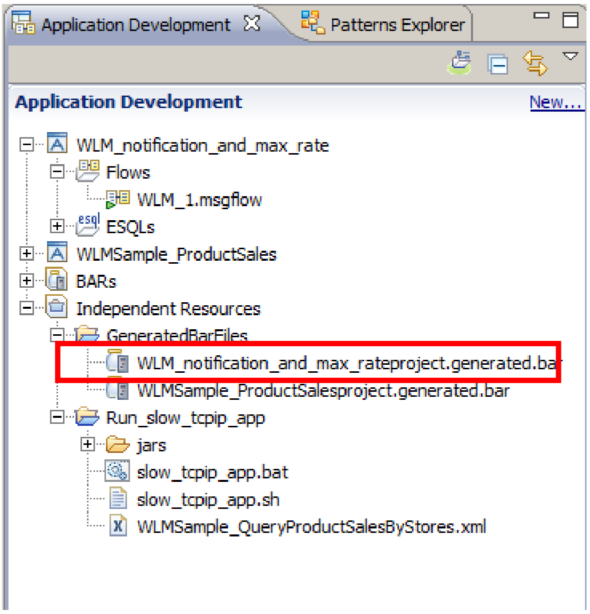
Message flow name: #

7. Notice that the alarm window is green indicating no alarms. Observe the graphs for both the sending application and the receiving application.

   They are very similar in that the message rate (messages per second) achieved by both sender and receiver are about the same. This tells you that the receiving application is keeping up with the sending application and is not being overloaded by the sender.

8. Return to the Integration Toolkit and expand the Independent Resources > GeneratedBarFiles.

   Double-click WLM_notification_and_max_rateproject.generated.bar to open it in the edit pane.

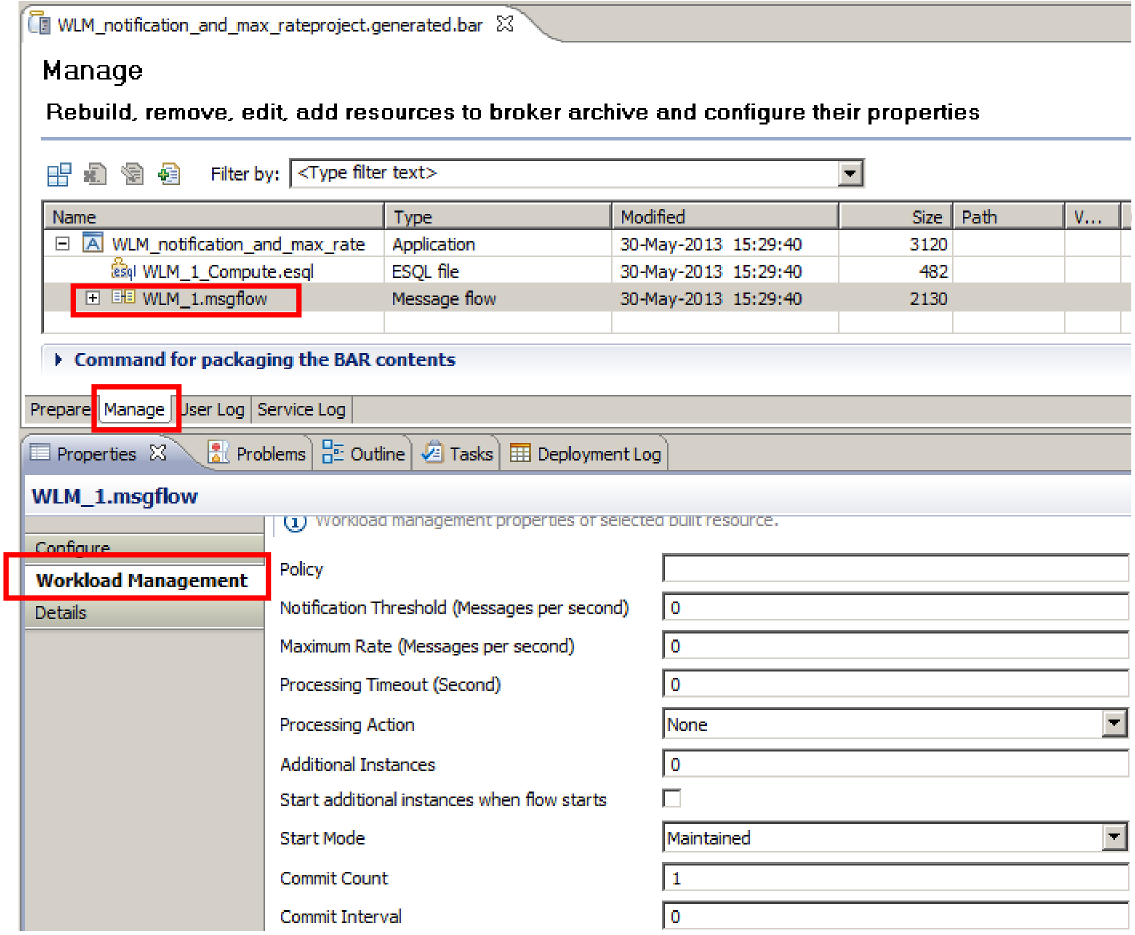


```
WLM_notification_and_max_rate
  Flows
    WLM_1.msgflow
  ESQLs
WLMSample_ProductSales
BARs
Independent Resources
  GeneratedBarFiles
    WLM_notification_and_max_rateproject.generated.ba
    WLMSample_ProductSalesproject.generated.bar
  Run_slow_tcpip_app
    jars
    slow_tcpip_app.bat
    slow_tcpip_app.sh
    WLMSample_QueryProductSalesByStores.xml
```

9. Click the Manage tab at the bottom of the editor.

   Expand the BAR file WLM_notification_and_max_rate and select the message flow WLM_1.msgflow.

   In its Properties pane, click Workload Management.



WLM_notification_and_max_rateproject.generated.bar

Manage

Rebuild, remove, edit, add resources to broker archive and configure their properties

Filter by: <Type filter text>

Name	Type	Modified	Size	Path	V...
⊟ WLM_notification_and_max_rate	Application	30-May-2013 15:29:40	3120		
WLM_1_Compute.esql	ESQL file	30-May-2013 15:29:40	482		
⊞ WLM_1.msgflow	Message flow	30-May-2013 15:29:40	2130		

▸ **Command for packaging the BAR contents**

WLM_1.msgflow

Workload management properties of selected built resource.

Policy	
Notification Threshold (Messages per second)	0
Maximum Rate (Messages per second)	0
Processing Timeout (Second)	0
Processing Action	None
Additional Instances	0
Start additional instances when flow starts	☐
Start Mode	Maintained
Commit Count	1
Commit Interval	0

   Notice the properties for Notification Threshold, Maximum Rate, and Processing Timeout are all zero and Processing Action is None. These are the default Workload Management values for all message flows.

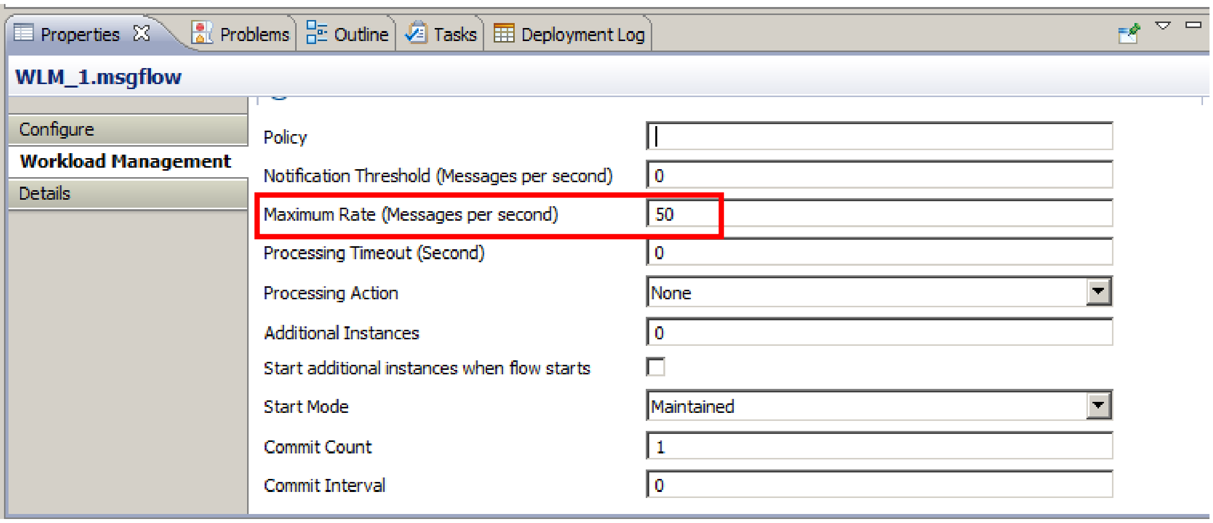
   You can review the other properties available, but we will not use those values in this lab.

10. Workload Management properties have no effect on the message flow or processing applications when the default policy is used.

    From observing the sending and receiving message rates, we can see that the WLM_1 message flow is not controlling the message rate. It will process them as fast it can.

3.4 Run the application with a barfile-defined message rate

1. Still working in the properties for the WLM_1.msgflow, set the values for Maximum Message Rate to 50.

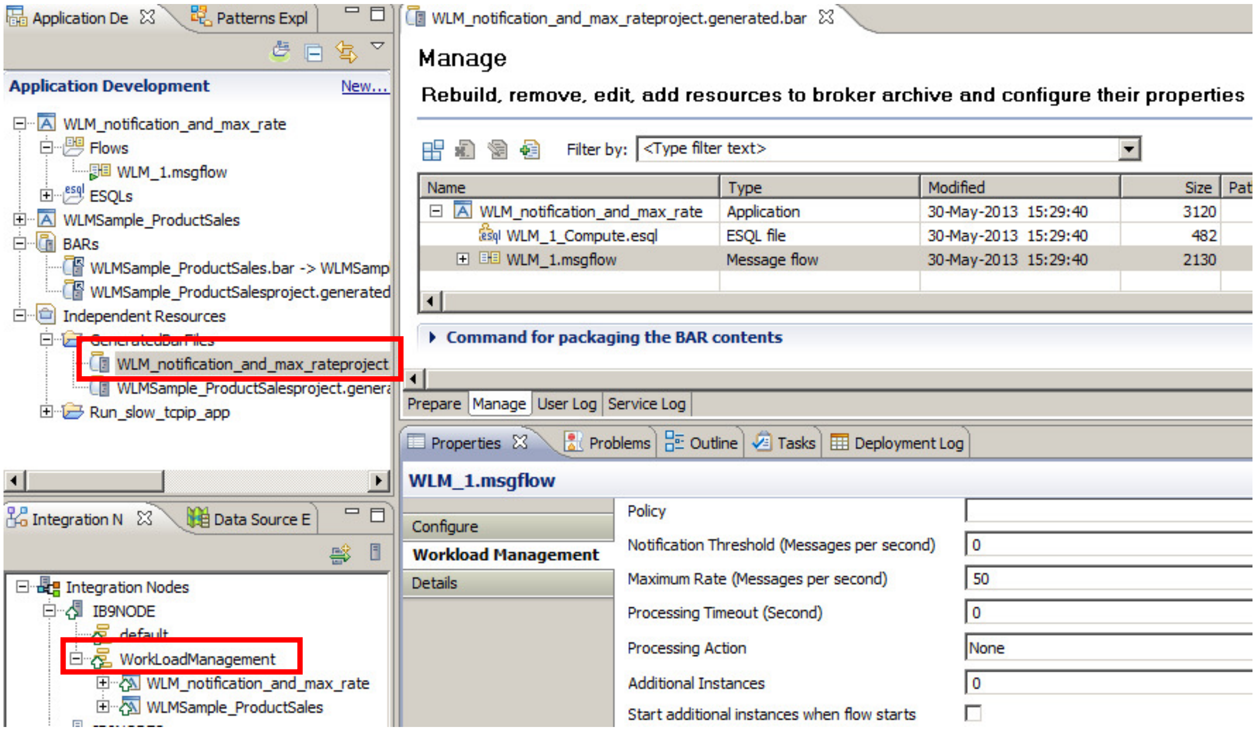


WLM_1.msgflow

Policy	
Notification Threshold (Messages per second)	0
Maximum Rate (Messages per second)	50
Processing Timeout (Second)	0
Processing Action	None
Additional Instances	0
Start additional instances when flow starts	□
Start Mode	Maintained
Commit Count	1
Commit Interval	0

Save the BAR file by typing Ctrl + S.

2. Drag and drop the bar file onto the integration server WorkloadManagement.


Application De
Patterns Expl
Application Development
New...
WLM_notification_and_max_rate
Flows
WLM_1.msgflow
ESQLs
WLMSample_ProductSales
BARs
WLMSample_ProductSales.bar -> WLMSamp
WLMSample_ProductSalesproject.generated
Independent Resources
GeneratedBarFiles
WLM_notification_and_max_rateproject
WLMSample_ProductSalesproject.genera
Run_slow_tcpip_app
Integration N
Data Source E
Integration Nodes
IB9NODE
default
WorkLoadManagement
WLM_notification_and_max_rate
WLMSample_ProductSales
WLM_notification_and_max_rateproject.generated.bar
Manage
Rebuild, remove, edit, add resources to broker archive and configure their properties
Filter by: <Type filter text>
Command for packaging the BAR contents
Prepare
Manage
User Log
Service Log
Properties
Problems
Outline
Tasks
Deployment Log
Configure
Workload Management
Details

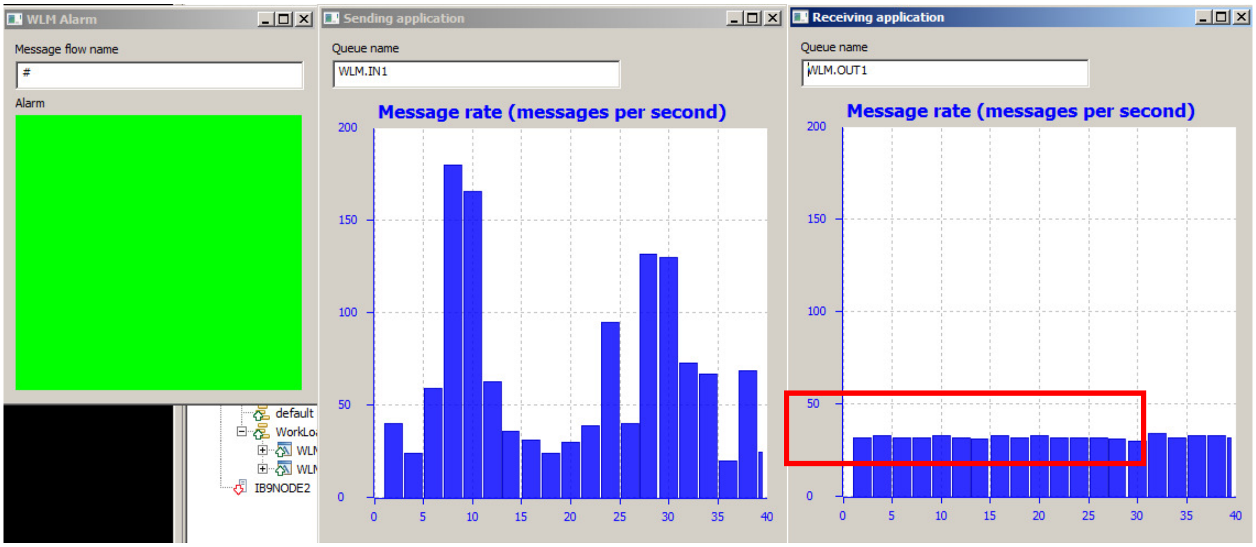
Name	Type	Modified	Size
WLM_notification_and_max_rate	Application	30-May-2013 15:29:40	3120
WLM_1_Compute.esql	ESQL file	30-May-2013 15:29:40	482
WLM_1.msgflow	Message flow	30-May-2013 15:29:40	2130

WLM_1.msgflow

Policy	
Notification Threshold (Messages per second)	0
Maximum Rate (Messages per second)	50
Processing Timeout (Second)	0
Processing Action	None
Additional Instances	0
Start additional instances when flow starts	□

3. Bring the sending and receiving programs (bar graph windows) back into focus.

   Observe the message rates for both applications to see if the new Workload Management property had any effect.

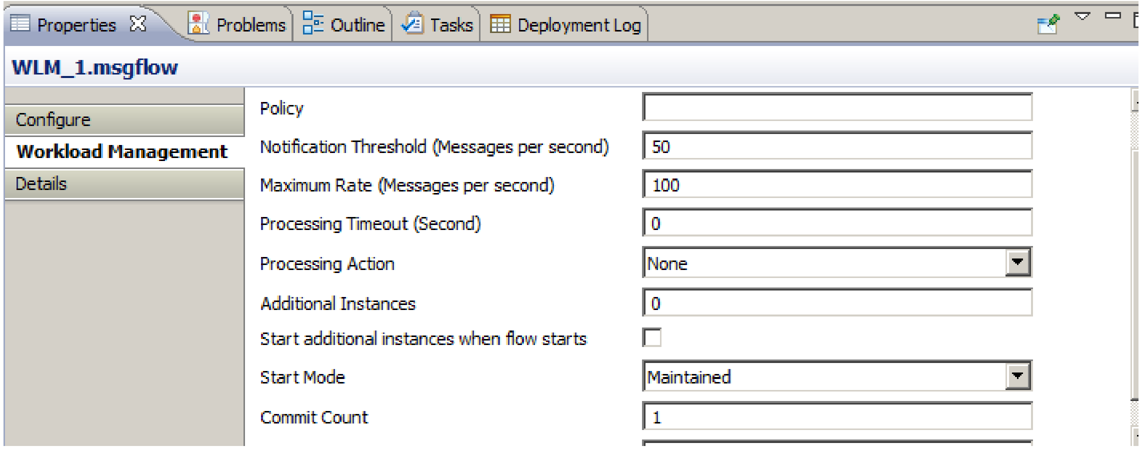


   The sending application is still sending processing and sending messages at his normal rate, but the receiving application is receiving the messages at a controlled rate at a maximum of fifty messages per second. Over the sampling intervals the rate does not show hitting fifty, but the graph is very smooth indicating that the messages are arriving at a constant rate.

   Compare this to what you saw before deploying the updated BAR file. This is important to note that IIB V9 message flows can now be configured to process at a certain rate that the back-end application can handle.

4. Let's assume that the receiving application developers made some significant performance improvements. They claim that the application can now process messages at one hundred per second. But they want to be notified if the rate goes over the old rate of fifty messages per second.

   Return to the toolkit and the properties pane for the message flow. Change the Maximum Message Rate to 100 and the Notification Threshold to 50.

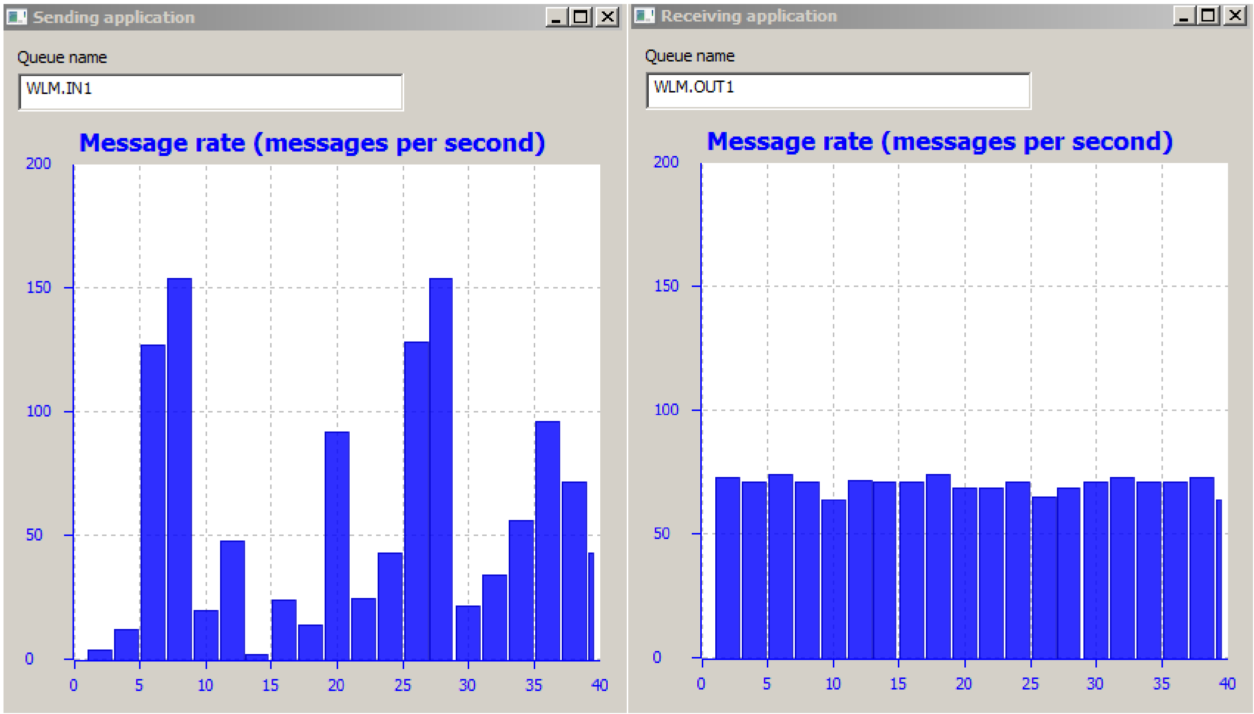


WLM_1.msgflow

Policy	
Notification Threshold (Messages per second)	50
Maximum Rate (Messages per second)	100
Processing Timeout (Second)	0
Processing Action	None
Additional Instances	0
Start additional instances when flow starts	□
Start Mode	Maintained
Commit Count	1

5. Save the barfile, and redeploy using your preferred method. The changes take effect immediately. The integration server nor the application nor the message flow needs to be restarted.

6. Bring the sending and receiving applications into focus and observe that receiving applications message rate has in fact increased. Again the rate is smoothed out over time and still does not show hitting 100.



Sending application

Queue name: WLM.IN1

Receiving application

Queue name: WLM.OUT1

Message rate (messages per second)
200
150
100
50
0
0
5
10
15
20
25
30
35
40
Message rate (messages per second)
200
150
100
50
0
0
5
10
15
20
25
30
35
40

7. Now that you see how easy it is to change values, you can quickly test various rates and notification thresholds. Spend some time experimenting before closing the applications.

8. When you are done experimenting, close the sending and receiving applications and the alarm application as well as the command prompts where you launched them. You can close the windows or enter Ctrl + C in the command window in which you start the application.

4. Subscribing to out of range message rate publications

Integration Bus V9 publishes messages for various workload conditions. Two of those publications are "above threshold" alerts and "below threshold" alerts for when the message rate goes out of range or back into range of the Notification Threshold property set for the message flows.

The topic strings are available for subscriptions to receive the alerts. You can define subscriptions with the MQ Explorer or write your own applications to subscribe to the publications for the execution groups, applications, and message flows which you are interested in.

4.1 Message publication when the message rate for a message flow is out of range

Once a Notification Threshold has been set for a message flow, the IIB will publish a message that the message rate is out of range. There are certain conditions which control the publishing of the message rate is out of range message.

The message rate statistics are collected at a checkpoint that occurs every 20 seconds. The total message rate is calculated at this checkpoint, and if the total message rate exceeds the notification threshold, the out of range XML message is published. If the total message rate continues to stay above the notification threshold, then no further out of range messages are published.

If you enable the notification threshold you can subscribe to the following topic:

```
$SYS/Broker/<brokerName>/WorkloadManagement/AboveThreshold/<executionGroupLab
el>/<applicationName>/<libraryName>/<messageFlowLabel>
```

where brokerName is the name of the broker, executionGroupLabel is the name of the execution group on that broker, applicationName is the name of the application on that execution group, libraryName is the name of the library on that application, and messageFlowLabel is the name of the message flow that is deployed to the library.

In the situation where the message flow is not contained in either an application or a library, the applicationName or libraryName parameters must be omitted along with their enclosing forward slash (/).

For example:
If the message flow is not contained in an application and a library:

```
$SYS/Broker/<brokerName>/WorkloadManagement/AboveThreshold/<executionGroupLab
el>/<messageFlowLabel>
```

If the message flow is contained in an application and not in a library:

```
$SYS/Broker/<brokerName>/WorkloadManagement/AboveThreshold/<executionGroupLab
el>/<applicationName>/<messageFlowLabel>
```

For further information, refer to the IIB InfoCenter.

4.2 Message publication when the message rate for a message flow goes back into range

When the notification threshold has been set for a message flow and the message rate exceeds the threshold, an out of range message is published as described above. IIB also publishes a message when the message rate goes back within range (under the threshold value). There are conditions which control the publishing of the message rate is back in range message.

The message rate statistics are collected at a checkpoint that occurs every 20 seconds and the total message rate is calculated at this checkpoint. If the total message rate previously exceeded the notification threshold, and then later the total message rate drops back into range, the back in range XML message is published.

No state is stored when the message flow is stopped, restarted, or redeployed. When a flow is terminated, the flow termination process checks to see whether the last message published was to report that the message rate exceeded the notification threshold. In this situation, the flow termination process automatically publishes a message to report that the message flow is now back in range.

If you enable the notification threshold you can subscribe to the following topic:

```
$SYS/Broker/<brokerName>/WorkloadManagement/BelowThreshold/<executionGroupLab
el>/<applicationName>/<libraryName>/<messageFlowLabel>
```

where brokerName is the name of the broker, executionGroupLabel is the name of the execution group on that broker, applicationName is the name of the application on that execution group, libraryName is the name of the library on that application, and messageFlowLabel is the name of the message flow that is deployed to the library.

In the situation where the message flow is not contained in either an application or a library, the applicationName or libraryName parameters must be omitted along with their enclosing forward slash (/). For example:
If the message flow is not contained in an application and a library:

```
$SYS/Broker/<brokerName>/WorkloadManagement/BelowThreshold/<executionGroupLab
el>/<messageFlowLabel>
```

where brokerName is the name of the broker, executionGroupLabel is the name of the execution group on that broker, and messageFlowLabel is the name of the message flow that is deployed to the execution group.

If the message flow is contained in an application and not in a library:

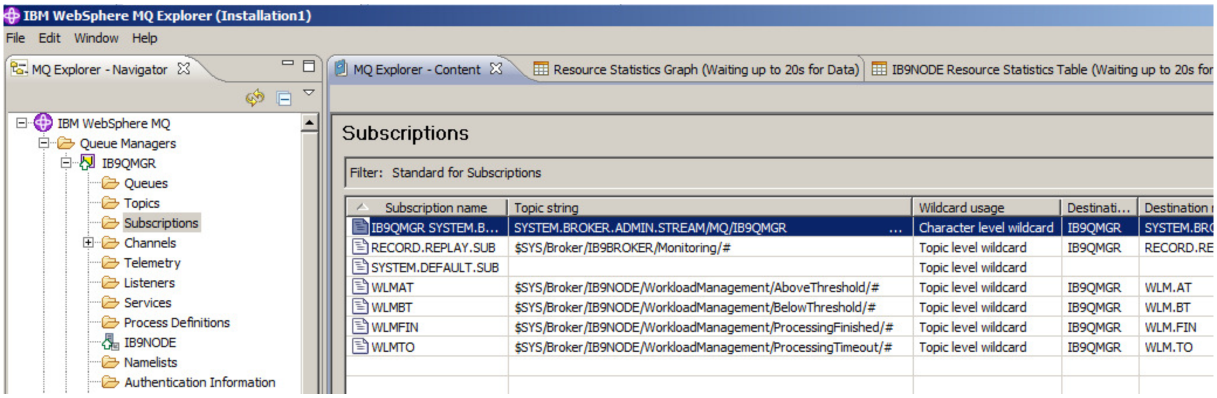
```
$SYS/Broker/<brokerName>/WorkloadManagement/BelowThreshold/<executionGroupLab
el>/<applicationName>/<messageFlowLabel>
```

where brokerName is the name of the broker, executionGroupLabel is the name of the execution group on that broker, applicationName is the name of the application on that execution group, and messageFlowLabel is the name of the message flow that is deployed to the application.

For further information, refer to the IIB InfoCenter.

4.3 Review the alerts

1. When the MQ queues and subscriptions were defined for this lab, two subscriptions were created for monitoring the notification threshold. The two subscriptions are WLMAT and WLMBT. Return to MQ Explorer and click on Subscriptions.



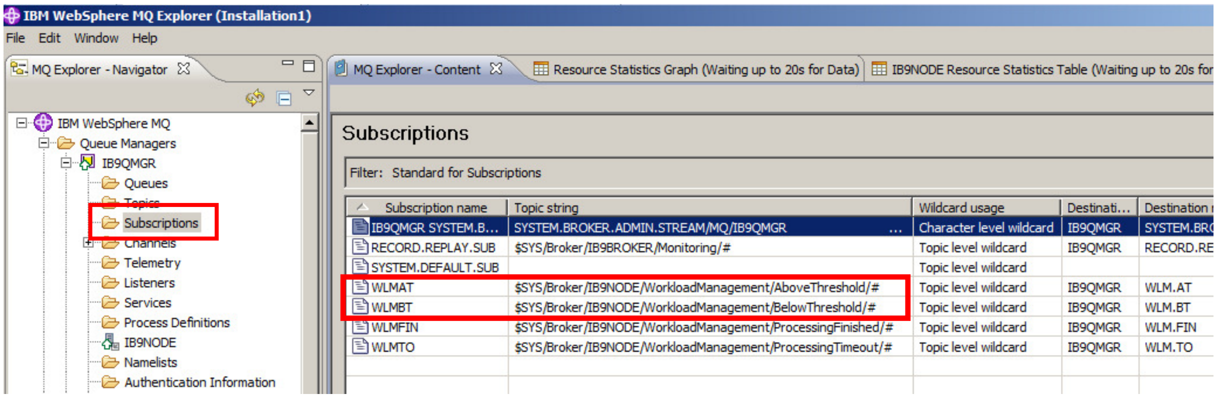
Subscriptions

Filter: Standard for Subscriptions

Subscription name	Topic string	Wildcard usage	Destinati...	Destination r
IB9QMGR SYSTEM.B...	SYSTEM.BROKER.ADMIN.STREAM/MQ/IB9QMGR ...	Character level wildcard	IB9QMGR	SYSTEM.BR(
RECORD.REPLAY.SUB	$SYS/Broker/IB9BROKER/Monitoring/#	Topic level wildcard	IB9QMGR	RECORD.RE
SYSTEM.DEFAULT.SUB		Topic level wildcard		
WLMAT	$SYS/Broker/IB9NODE/WorkloadManagement/AboveThreshold/#	Topic level wildcard	IB9QMGR	WLM.AT
WLMBT	$SYS/Broker/IB9NODE/WorkloadManagement/BelowThreshold/#	Topic level wildcard	IB9QMGR	WLM.BT
WLMFIN	$SYS/Broker/IB9NODE/WorkloadManagement/ProcessingFinished/#	Topic level wildcard	IB9QMGR	WLM.FIN
WLMTO	$SYS/Broker/IB9NODE/WorkloadManagement/ProcessingTimeout/#	Topic level wildcard	IB9QMGR	WLM.TO

2. You can see that the subscription WLMAT is receiving alert publications for the topic string *$SYS/Broker/IB9NODE/WorkloadManagement/AboveThreshold/#* published by the broker. The hash is a wild card so it will receive "above threshold" alerts for all execution groups, all applications, and all message flows which have been deployed with a Notification Threshold property set. Observe the queue names for the subscriptions WLMAT (WLM.AT) and WLMBT (WLM.BT). The topic string is defined by IIB and is in a specific format. This should not be changed by users.

   Note: You may need to scroll to the right to see the Destination Queue Manager and Destination columns. Some columns were hidden in the screen shot below.

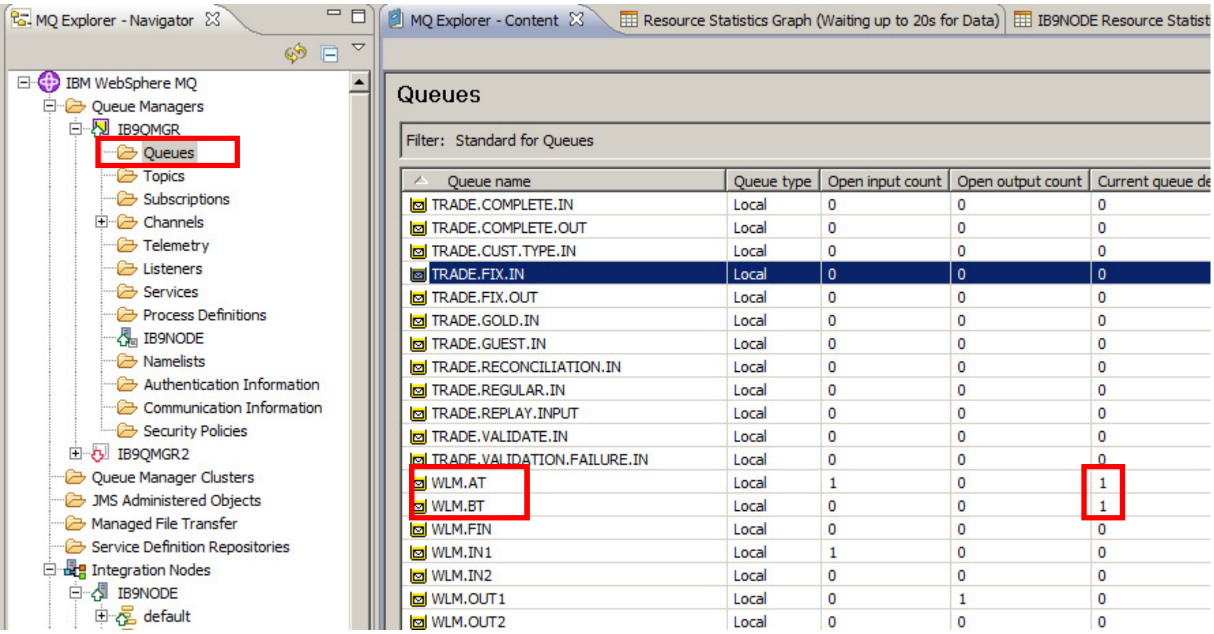


Subscriptions

Filter: Standard for Subscriptions

Subscription name	Topic string	Wildcard usage	Destinati...	Destination r
IB9QMGR SYSTEM.B...	SYSTEM.BROKER.ADMIN.STREAM/MQ/IB9QMGR ...	Character level wildcard	IB9QMGR	SYSTEM.BR(
RECORD.REPLAY.SUB	$SYS/Broker/IB9BROKER/Monitoring/#	Topic level wildcard	IB9QMGR	RECORD.RE
SYSTEM.DEFAULT.SUB		Topic level wildcard		
WLMAT	$SYS/Broker/IB9NODE/WorkloadManagement/AboveThreshold/#	Topic level wildcard	IB9QMGR	WLM.AT
WLMBT	$SYS/Broker/IB9NODE/WorkloadManagement/BelowThreshold/#	Topic level wildcard	IB9QMGR	WLM.BT
WLMFIN	$SYS/Broker/IB9NODE/WorkloadManagement/ProcessingFinished/#	Topic level wildcard	IB9QMGR	WLM.FIN
WLMTO	$SYS/Broker/IB9NODE/WorkloadManagement/ProcessingTimeout/#	Topic level wildcard	IB9QMGR	WLM.TO

3. **Click on Queues and locate the WLM* queues.**



Filter: Standard for Queues

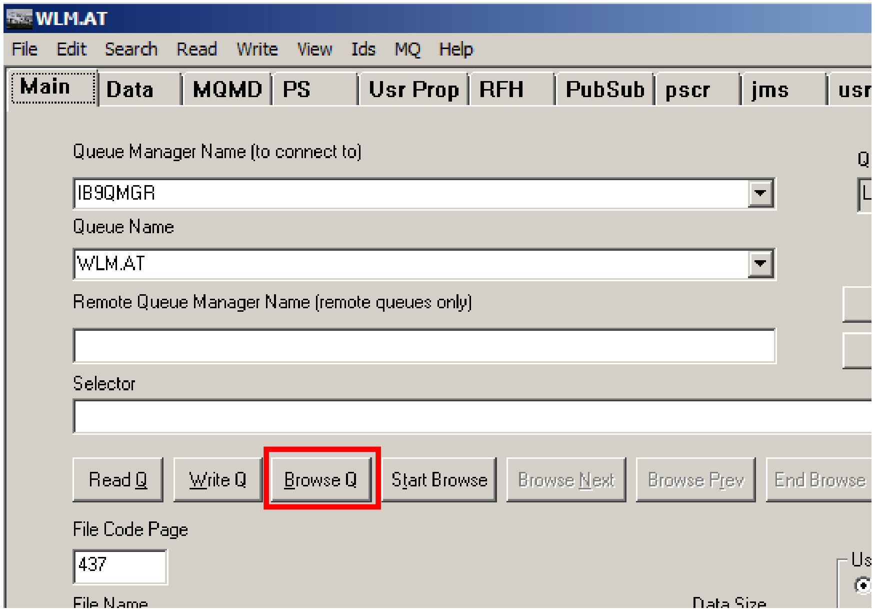
Queue name	Queue type	Open input count	Open output count	Current queue de
TRADE.COMPLETE.IN	Local	0	0	0
TRADE.COMPLETE.OUT	Local	0	0	0
TRADE.CUST.TYPE.IN	Local	0	0	0
TRADE.FIX.IN	Local	0	0	0
TRADE.FIX.OUT	Local	0	0	0
TRADE.GOLD.IN	Local	0	0	0
TRADE.GUEST.IN	Local	0	0	0
TRADE.RECONCILIATION.IN	Local	0	0	0
TRADE.REGULAR.IN	Local	0	0	0
TRADE.REPLAY.INPUT	Local	0	0	0
TRADE.VALIDATE.IN	Local	0	0	0
TRADE.VALIDATION.FAILURE.IN	Local	0	0	0
WLM.AT	Local	1	0	1
WLM.BT	Local	0	0	1
WLM.FIN	Local	0	0	0
WLM.IN1	Local	1	0	0
WLM.IN2	Local	0	0	0
WLM.OUT1	Local	0	1	0
WLM.OUT2	Local	0	0	0

4. Look to see if you have any messages in the WLM.AT and WLM.BT. You should have received some during the above tests. If not, you may need to adjust your Notification Threshold to a lower value and rerun the tests.

   During my test, I received one “above threshold” alert when the value was set at twenty message per second. When the test hit a rate of twenty messages per second, a alert was published. Since there was only one alert received, the message rate stayed above twenty during most of the run. When the rate when below twenty, a “below threshold” alert was published. The rate did not go above twenty during the rest of the run since there were no more alerts.

5. Open RHFUtil from the Start button.
   Use the pull-down mens to populate the Queue Manager Name with IB9QMGR and the Queue Name with WLM.AT.

   Click Browse Q.


WLM.AT
File Edit Search Read Write View Ids MQ Help
Main Data MQMD PS Usr Prop RFH PubSub pscr jms usr
Read Q
Write Q
Browse Q
Start Browse
Browse Next
Browse Prev
End Browse

Queue Manager Name (to connect to)
IB9QMGR

Queue Name
WLM.AT

Remote Queue Manager Name (remote queues only)

Selector

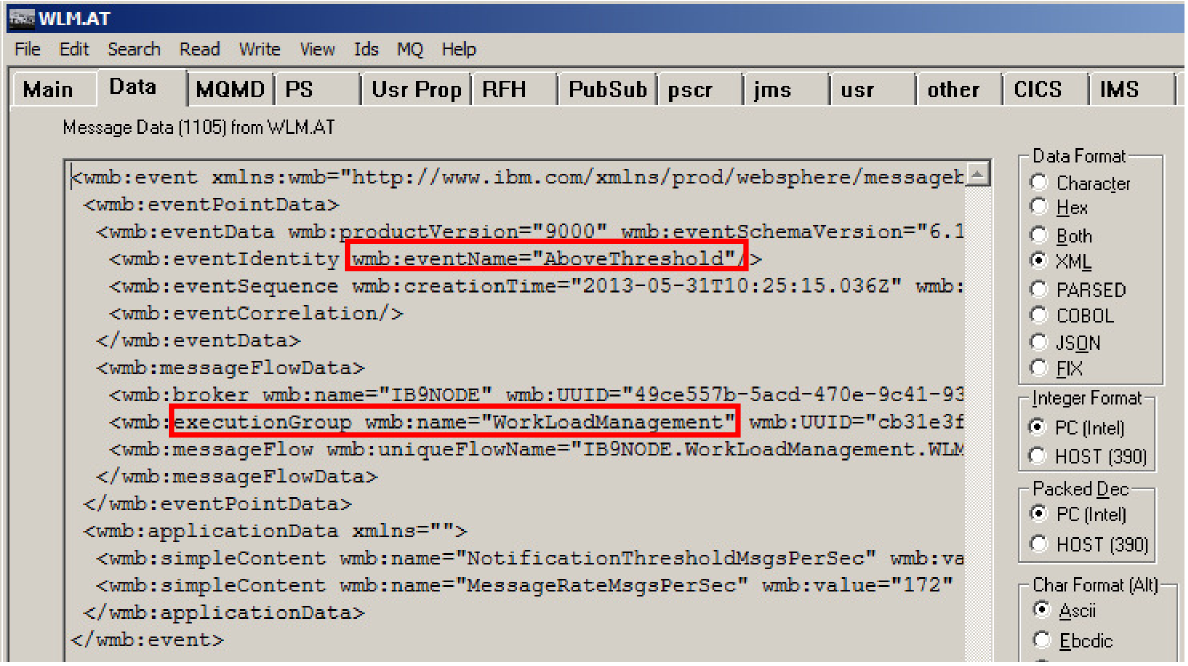
File Code Page
437

File Name

Data Size

6. Click on the Data tab at the top of the window and click on XML under Data Format to format the data.

   Review the XML message which was received. The event was an “AboveThreshold”. The execution group is identified – WorkLoadManagement.


WLM.AT
File Edit Search Read Write View Ids MQ Help
Main Data MQMD PS Usr Prop RFH PubSub pscr jms usr other CICS IMS

Message Data (1105) from WLM.AT

```
<wmb:event xmlns:wmb="http://www.ibm.com/xmlns/prod/websphere/messageb
 <wmb:eventPointData>
  <wmb:eventData wmb:productVersion="9000" wmb:eventSchemaVersion="6.1
   <wmb:eventIdentity wmb:eventName="AboveThreshold"/>
   <wmb:eventSequence wmb:creationTime="2013-05-31T10:25:15.036Z" wmb:
   <wmb:eventCorrelation/>
  </wmb:eventData>
  <wmb:messageFlowData>
   <wmb:broker wmb:name="IB9NODE" wmb:UUID="49ce557b-5acd-470e-9c41-93
   <wmb:executionGroup wmb:name="WorkLoadManagement" wmb:UUID="cb31e3f
   <wmb:messageFlow wmb:uniqueFlowName="IB9NODE.WorkLoadManagement.WLM
  </wmb:messageFlowData>
 </wmb:eventPointData>
 <wmb:applicationData xmlns="">
  <wmb:simpleContent wmb:name="NotificationThresholdMsgsPerSec" wmb:va
  <wmb:simpleContent wmb:name="MessageRateMsgsPerSec" wmb:value="172"
 </wmb:applicationData>
</wmb:event>
```

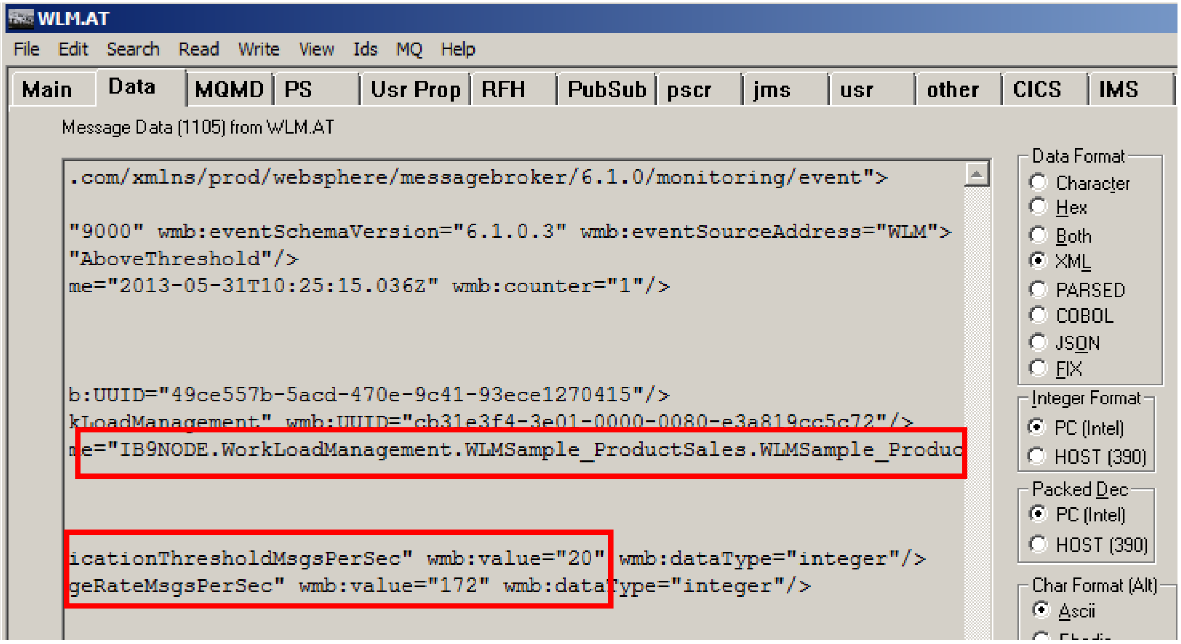
Data Format
○ Character
○ Hex
○ Both
● XML
○ PARSED
○ COBOL
○ JSON
○ FIX

Integer Format
● PC (Intel)
○ HOST (390)

Packed Dec
● PC (Intel)
○ HOST (390)

Char Format (Alt)
● Ascii
○ Ebcdic

You will need to scroll to the right to see all of the fields. After scrolling right, you will see the Application and message flow names. You can also see the Threshold Notification value for the message flow and the actual message rate which caused the alert.


WLM.AT
File Edit Search Read Write View Ids MQ Help
Main Data MQMD PS Usr Prop RFH PubSub pscr jms usr other CICS IMS

Message Data (1105) from WLM.AT

```
.com/xmlns/prod/websphere/messagebroker/6.1.0/monitoring/event">

"9000" wmb:eventSchemaVersion="6.1.0.3" wmb:eventSourceAddress="WLM">
"AboveThreshold"/>
me="2013-05-31T10:25:15.036Z" wmb:counter="1"/>



b:UUID="49ce557b-5acd-470e-9c41-93ece1270415"/>
kLoadManagement" wmb:UUID="cb31e3f4-3e01-0000-0080-e3a819cc5c72"/>
me="IB9NODE.WorkLoadManagement.WLMSample_ProductSales.WLMSample_Produc


icationThresholdMsgsPerSec" wmb:value="20" wmb:dataType="integer"/>
geRateMsgsPerSec" wmb:value="172" wmb:dataType="integer"/>
```

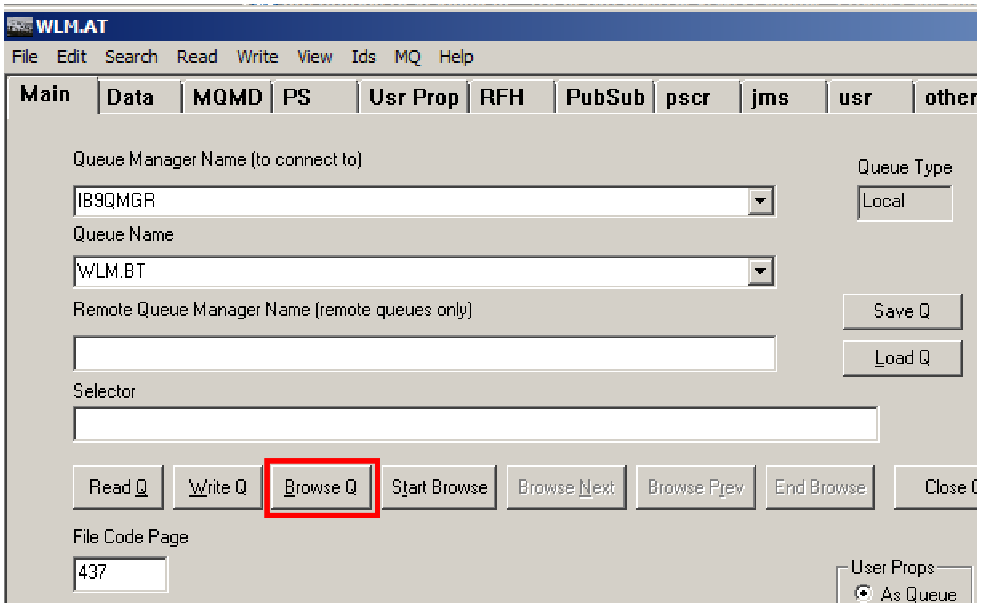
Data Format
○ Character
○ Hex
○ Both
● XML
○ PARSED
○ COBOL
○ JSON
○ FIX

Integer Format
● PC (Intel)
○ HOST (390)

Packed Dec
● PC (Intel)
○ HOST (390)

Char Format (Alt)
● Ascii
○ Ebcdic

7. Click on the Main tab and browse the queue WLM.BT.


WLM.AT
File Edit Search Read Write View Ids MQ Help
Main Data MQMD PS Usr Prop RFH PubSub pscr jms usr other
Save Q
Load Q
Read Q
Write Q
Browse Q
Start Browse
Browse Next
Browse Prev
End Browse
Close Q

Queue Manager Name (to connect to): IB9QMGR

Queue Type: Local

Queue Name: WLM.BT

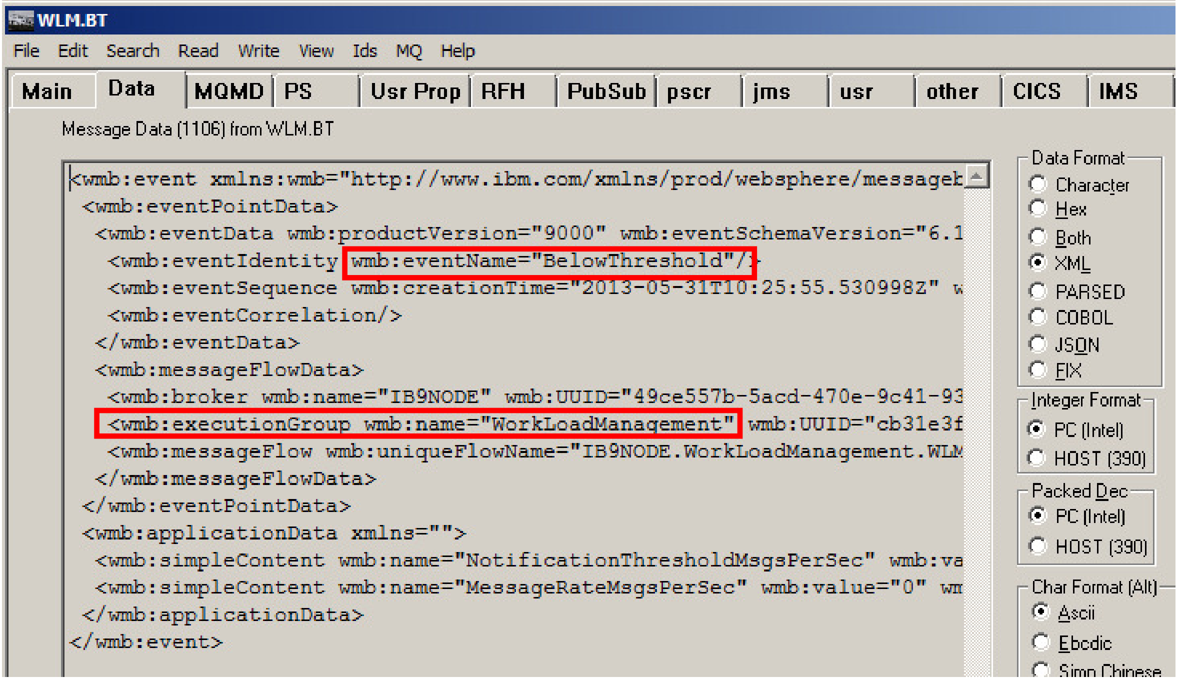
Remote Queue Manager Name (remote queues only):

Selector:

File Code Page: 437

User Props
● As Queue

8. Click on the Data tab again and review the “Below Threshold” alert.


WLM.BT
File Edit Search Read Write View Ids MQ Help
Main Data MQMD PS Usr Prop RFH PubSub pscr jms usr other CICS IMS

Message Data (1106) from WLM.BT

```
<wmb:event xmlns:wmb="http://www.ibm.com/xmlns/prod/websphere/messageb
 <wmb:eventPointData>
  <wmb:eventData wmb:productVersion="9000" wmb:eventSchemaVersion="6.1
   <wmb:eventIdentity wmb:eventName="BelowThreshold"/>
   <wmb:eventSequence wmb:creationTime="2013-05-31T10:25:55.530998Z" w
   <wmb:eventCorrelation/>
  </wmb:eventData>
  <wmb:messageFlowData>
   <wmb:broker wmb:name="IB9NODE" wmb:UUID="49ce557b-5acd-470e-9c41-93
   <wmb:executionGroup wmb:name="WorkLoadManagement" wmb:UUID="cb31e3f
   <wmb:messageFlow wmb:uniqueFlowName="IB9NODE.WorkLoadManagement.WLM
  </wmb:messageFlowData>
 </wmb:eventPointData>
 <wmb:applicationData xmlns="">
  <wmb:simpleContent wmb:name="NotificationThresholdMsgsPerSec" wmb:va
  <wmb:simpleContent wmb:name="MessageRateMsgsPerSec" wmb:value="0" wm
 </wmb:applicationData>
</wmb:event>
```

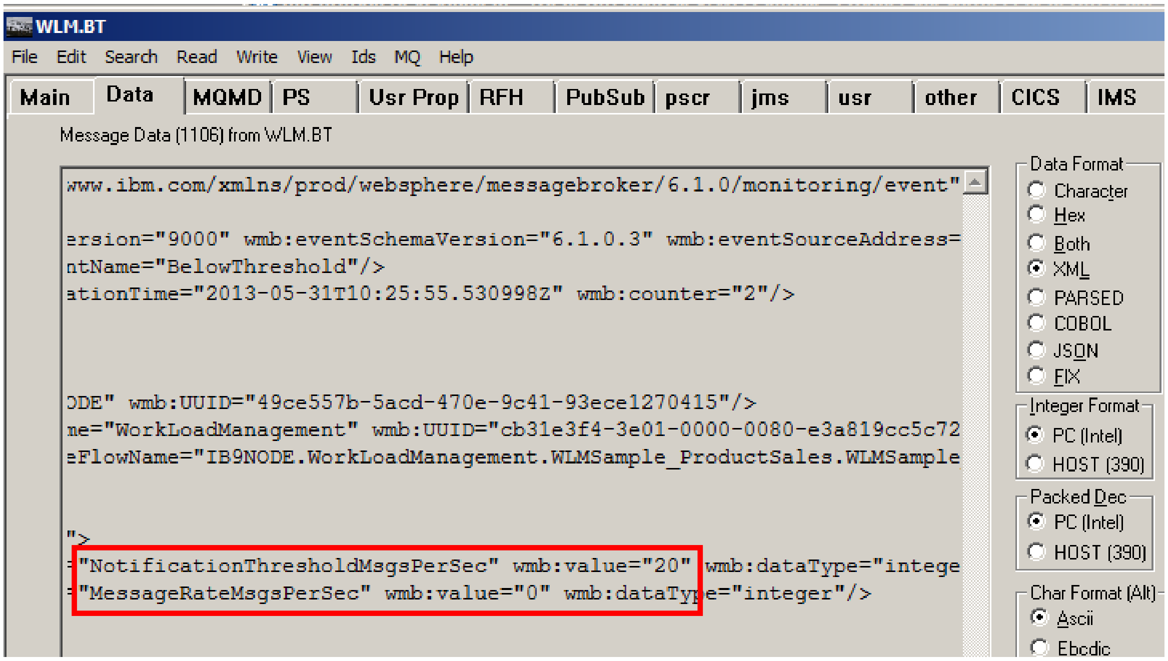
Data Format: ○ Character ○ Hex ○ Both ● XML ○ PARSED ○ COBOL ○ JSON ○ FIX

Integer Format: ● PC (Intel) ○ HOST (390)

Packed Dec: ● PC (Intel) ○ HOST (390)

Char Format (Alt): ● Ascii ○ Ebcdic ○ Simp Chinese

Scroll to the right to see the rest of the message. The NoticationThreshold rate is shown again, but now you see the message rate that caused the alert to be published that the rate was again back in range. This value shows zero. Remember the sampling covers a twenty second interval.


WLM.BT
File Edit Search Read Write View Ids MQ Help
Main Data MQMD PS Usr Prop RFH PubSub pscr jms usr other CICS IMS

Message Data (1106) from WLM.BT

```
www.ibm.com/xmlns/prod/websphere/messagebroker/6.1.0/monitoring/event"

ersion="9000" wmb:eventSchemaVersion="6.1.0.3" wmb:eventSourceAddress=
ntName="BelowThreshold"/>
ationTime="2013-05-31T10:25:55.530998Z" wmb:counter="2"/>



ODE" wmb:UUID="49ce557b-5acd-470e-9c41-93ece1270415"/>
me="WorkLoadManagement" wmb:UUID="cb31e3f4-3e01-0000-0080-e3a819cc5c72
eFlowName="IB9NODE.WorkLoadManagement.WLMSample_ProductSales.WLMSample


">
="NotificationThresholdMsgsPerSec" wmb:value="20" wmb:dataType="intege
="MessageRateMsgsPerSec" wmb:value="0" wmb:dataType="integer"/>
```

Data Format: ○ Character ○ Hex ○ Both ● XML ○ PARSED ○ COBOL ○ JSON ○ FIX

Integer Format: ● PC (Intel) ○ HOST (390)

Packed Dec: ● PC (Intel) ○ HOST (390)

Char Format (Alt): ● Ascii ○ Ebcdic

Summary - Workload Management Throughput Control

In this lab, you learned about the new Workload Management feature in IBM Integration Bus V9. You learned how to set properties on the message flow for monitoring the workload or message rate for particular. This allows system administrators to monitor and adjust the speed that messages are processed.

You also learned how to set the maximum rate for a message flow to control the workload on backend applications.

In addition to setting properties for message flow workload, you learned how to receive alerts from the Integration Bus by subscribing to specific topic strings being published base on the setting for the flows.

This concludes the Workload Management Throughput Control lab.